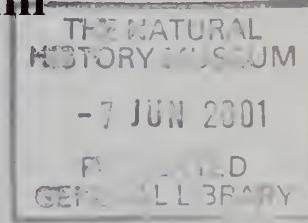


# A revision of the tribe Macariini (Lepidoptera: Geometridae: Ennominae) of Africa, Madagascar and Arabia



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**SYNOPSIS.** A revision of the Macariini (Lepidoptera: Geometridae: Ennominae) of Africa, Madagascar and Arabia, comprising a total of 270 species, is presented as part of an international effort to revise the macariine world fauna. Major changes to global macariine taxonomy are proposed at generic and tribal levels. Practically all accessible

primary types were examined. The Macariini of the study area comprise 14 genera, three of which are described as new. Five of these, *Itame* Hübner, *Tephrina* Guenée, *Boarnioides* Lucas, *Macaria* Curtis and *Narraga* Walker, are confined to Palaearctic North Africa. The tribe and the genera are defined or redefined. Revision resulted in the description of 89 new species, one new subspecies and the establishment of 30 new specific and seven new generic synonymies. *Milocera dubia* (Prout), *Chiasmia coronoleucas* (Prout), *C. ammodes* (Prout), *C. sareptanaria* (Staudinger) and *C. tenuiata* (Staudinger) are raised to specific status. Lectotypes were designated for 60 taxa. A total of 178 new combinations is proposed; one species is removed from *Isturgia* Hübner. Nine species (*Isturgia triseriata* (Prout), *Chiasmia fuscataria* (Möschler), *C. geminilinea* (Prout), *C. infabricata* (Prout), *C. nana* (Warren), *C. semicolor* (Warren), *C. suriens* (Strand), *C. threnopsis* (Fletcher) and *C. unifilata* (Warren)) are recorded from southern Africa for the first time. Keys to subtribes, genera and species, as well as illustrations of adults and genitalia of all available species are provided. The phylogenetic position of the enigmatic monotypic genus *Malgassothisa* Herbolut is discussed and it is concluded that *Malgassothisa* probably represents a highly derived lineage of uncertain affinities. The morphology of the early stages and adult moths was examined for deriving taxonomic characters. Complete or partial descriptions are made for the early stages of 14 species. Information on life cycle, larval foodplants and parasitoids was collated. Distribution maps were prepared for 115 of the 116 species recorded from southern Africa. The biogeography and habitat associations of Macariini are discussed. Many species-groups exhibit fairly strong associations with one of the major biomes. Extant distribution patterns are interpreted as the combined result of historical processes and ecological constraints. Hypotheses about the evolutionary history of Macariini are provided. Cladistic analyses were carried out to determine relationships between selected macariline genera on a world level and to elucidate the phylogeny of species-groups within the two largest Afrotropical genera, *Chiasmia* Hübner and *Isturgia* Hübner. A gazetteer and a list of species and subspecies on a country basis complement the study.

Key words: Lepidoptera; Geometridae; Ennominae; Macariini; Afrotropical; Palaearctic; distribution; keys; biology.

## INTRODUCTION

Macariini are a tribe of ennomine Geometridae that occur throughout the world but are poorly represented in Australia (Nielsen *et al.*, 1996). The adult moths are predominantly nocturnal, with cryptically patterned wings. The larvae feed on a variety of plants; in the Afrotropical region they are mostly associated with leguminous trees, particularly of the large genus *Acacia*.

It was intended, originally, to restrict this study to the Macariini of southern Africa, which were last revised by Janse (1932). However, it soon became apparent that many questions, particularly concerning the phylogeny of Macariini, could only be effectively addressed in a wider geographical context. It was thus decided to include the entire Afrotropical fauna; the relatively few species found in Palaearctic Africa, Arabia and the Middle East were also included because of their faunistic interest. The present contribution should be seen against the background of a current international effort to revise the Macariini on as wide a geographical scale as possible (Holloway, [1994]; Ferguson, *in prep.*; Scoble & Krüger, *in prep.*).

Apart from resolving as many of the numerous

nomenclatural and taxonomic problems as possible in the Afrotropical Macariini, the present work also aims to contribute towards a better understanding of the tribal classification of the Ennominae. Although the exact position of Macariini within the subfamily remains unresolved, several likely sister-groups for Macariini are proposed.

As work progressed, it became clear that the composition of the tribe was more inclusive than the existing literature indicated. While members of 'typical' macariline genera (such as *Chiasmia*, *Macaria* or *Semiothisa*) are easily recognizable as such by external features, other genera are less obviously members of the tribe, a recognition problem that is aggravated in some instances by convergence in wing pattern both within and outside Macariini. A further taxonomic problem encountered is the fact that the two synapomorphies defining the tribe are not always both present. The majority of macariline genera were described before the importance of genitalic structure was realized early in the 20th century and are thus based, inadequately, on external characters alone. Even when considering genitalic characters as well, difficulties were encountered in finding suitable synapomorphies to define the various genera of 'horned' and unhorned Macariini.

Another aim of this study was to improve our understanding of the phylogeny of Macariini. An important result was the identification of a group of genera which cladistic analysis suggests form a distinct clade, the *Platypepla* group of genera. While sharing several characters from the macariine 'groundplan', members of this clade exhibit a range of variation in male genitalic structure that exceeds that of the species-rich genera like *Isturgia* or *Chiasmia* and contrasts with their uniform facies. With few exceptions, the *Platypepla* group is confined to the Afrotropical region.

Cladistic and biogeographical analysis provides evidence for a post-Gondwanan origin of Macariini in the Afrotropical region. Furthermore, part of the evolutionary history of many lineages is reflected in the habitat associations of extant members, and notably the more derived species are likely to have arisen in the savanna ecosystem of Africa.

## History of family-group names

The history of macariine family-group names was summarized by Holloway ([1994]). The first name to appear in the literature seems to have been 'Macaridae' (Guenée, [1858]); this name therefore takes priority (as Macariini). Holloway noted the more extensive usage in the literature of Semiothisini (based on Semiothisinae Warren, 1894). Not only is Semiothisini a later name, but its usage would cause considerable confusion due to past misinterpretation of the type species of *Semiothisa* Hübner – a name that has been variously applied to unrelated Old and New World species. Fidoninae *se sensu* Packard (1876), comprising the Macaridae, Zerenidae and Fidonidae of Guenée ([1858]), are based on Fidonites Duponchel (1844). *Fidonia* Treitschke, a junior objective synonym of *Eurranthis* Hübner (type species *Phalaena plumistraria* Villers) (Fletcher, 1979), differs from Macariini (as Semiothisini) in the sense of Forbes (1948) and Holloway ([1994]). McGuffin (1972) included *Fernaldella* Hulst (with three Nearctic species) in his concept of Semiothisini, so Fernaldellinae Hulst (1896) is relevant here. The close relationship between this genus and the Palaearctic genus *Narraga* Walker was already noted by McGuffin (*loc. cit.*); indeed, *Fernaldella* was treated as a junior synonym of *Narraga* by Povolny & Moucha (1959) and Hodges *et al.* (1983), a decision followed in the present work.

Most of the early systematic work on the Afrotropical macariine fauna was done by Warren (1894–1914). He defined what he termed Semiothisinae entirely on external characters and consequently included some genera that do not belong in Macariini. True Macariini included by Warren were: *Semiothisa* Hübner, *Hyostomodes* Warren, *Acadra* Herrich-Schäffer, *Evarzia* Walker, *Tephriua* Guenée (which he misapplied to horned forms), *Oxymacaria* Warren (with its

synonym *Xenoneura* Warren, an invalid homonym of *Xenoneura* Scudder [Neuroptera]) (Fletcher, 1979), *Tephriopsis* Warren, *Gonodela* Boisduval and *Thamnonoma* Lederer (a junior objective synonym of *Grammatophora* Stephens). Several of the macariine genera Warren recognized were synonymized recently with *Godonela* by Holloway ([1994]). These include *Acadra* Herrich-Schäffer (type species *rectistriaria* Herrich-Schäffer from South Africa), *Evarzia* Walker (type species *ozararia* Walker from Borneo), and *Gubaria* Moore (type species *fasciosaria* Hübner from India). Others, including *Bulonga* Walker, *Chorodnodes* Warren, *Petrodava* Walker and *Nadaragodes* Warren, fall outside the concept of Macariini adopted in this study.

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## METHODS

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The majority of specimens examined for this study came from the extensive collection of southern African Geometridae housed at the Transvaal Museum, Pretoria, South Africa (TM). Material was also examined from the institutions listed below. With the exception of the Wiesbaden Museum and the Transvaal Museum acronyms follow Heppner & Lamas (1982).

The Natural History Museum (formerly British Museum (Natural History)), London, U.K. (BMNH) provided many types and other specimens. In Europe and the United States further material was examined from the following institutions and private collections: Universitets Zoologiska Institut, Lund, Sweden (UZIL); Naturhistoriska Riksmuseet, Stockholm, Sweden (NRS); Magyar Termeszettudományi Múzeum, Budapest, Hungary (TMB); University Museum, Oxford, England (OMU); Deutsches Entomologisches Institut, Eberswalde, Germany; Zoologisches Museum der Humboldt Universität, Berlin, Germany (ZMHB); Zoologisches Museum und Forschungsanstalt Senckenberg, Frankfurt/M., Germany (SMF); Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn, Germany (MAKB); Museum Wiesbaden, Germany; Zoologische Staatssammlung, Munich, Germany (ZSBS); Nationaal Natuurhistorisch Museum, Leiden, The Netherlands (NNML); Muséum National d'Histoire Naturelle, Paris, France (MNHN); C. Herbulot collection, Paris, France; Muséum Royal de l'Afrique Centrale, Tervuren, Belgium (MRAC); Naturhistorisches Museum, Basel, Switzerland (NHMB); Muséum d'Histoire Naturelle, Geneva, Switzerland (MHNG); Zoological Museum 'La Specola', Florence, Italy (MZB); and National Museum of Natural History, Washington, U.S.A. (NMNH). In Africa, material from the following collections was examined: National Museums of Kenya, Nairobi, Kenya (NMKE); National Museum of Natural History, Bulawayo, Zimbabwe

(NMB); National Collection of Insects, Pretoria, South Africa (NCI), South African Museum, Cape Town, South Africa (SAM); and the private collections of the late Mr N.J. Duke, Mbabane, Swaziland (NJD); Dr D.M. Kroon, Sasolburg, South Africa (DMK); Mr H.S. Staude, Krugersdorp, South Africa (HSS) and Mr. P.S. Roos, Turffontein, South Africa (PSR).

Approximately 14,000 adult specimens were examined, including most primary types. From this material, about 900 microscopic slides, mostly of genitalia, but also of wings and other body parts, were prepared.

Preparation of genitalia slides followed the techniques outlined in Robinson (1976). Specimens were stained in a weak alcoholic solution of mercurochrome and slide mounted in Euparal.

Illustrations were prepared using a Britex projection microscope and a WILD dissection microscope (type 181300) with attached *camera lucida*.

Eggs previously stored in 70% ethanol were prepared for scanning electron microscopy by fixing in 2.5% glutaraldehyde, rinsing in phosphate buffer and fixing in 0.25% aqueous osmium tetroxide according to the method described in Coetzee & van der Merwe (1994). SEM micrographs were taken with scanning electron microscopes of the types JEOL 840 and Hitachi S-510.

## Gazetteer

Due to inadequate labelling of specimens, considerable difficulties were encountered during preparation of the distribution maps and compilation of the gazetteer. In addition to several atlases, a number of other gazetteers was consulted (Anonymous, 1950–1972; Leistner & Morris, 1976; Crawford-Cabral & Mesquitela, 1989; Viette, 1991). Even so, many localities remain obscure.

Since completion of the distribution maps, provincial boundaries in South Africa have been redrawn, increasing the number of provinces from four (Transvaal, Orange Free State, Natal and Cape Province) to nine (Gauteng, Northern Province, North-West, Mpumalanga, Free State, KwaZulu-Natal, Northern Cape, Eastern Cape and Western Cape). In the Gazetteer, South African localities appear under the new provincial names; throughout the descriptive section the new names appear in square brackets.

## Measurements and terminology

Fore wing length was measured, to the nearest millimetre, as the distance between wing base and apex. The ranges given are those of the smallest and largest specimen in the series examined.

Unless indicated otherwise, measurements of eggs and larvae are based on a representative sample of five specimens.

The terminology for genitalia is based on Klots (1970). A few additional terms are also used; these are explained in Figs 19 and 20.

For the description of wing venation, the generally accepted system of Comstock & Needham (1898/99) was adopted.

## Keys

Keys are provided to all species and to the species-groups within *Milocera* Swinhoe, *Isturgia* Hübner and *Chiasmia* Hübner. These keys are mostly based on male genitalia structure, complemented, where applicable, by characters provided by female genitalia and general facies of the adult. Since many characters such as valve shape and wing markings occur more than once, and apparently independently of each other, it is imperative to use all information provided in a couplet to determine certain species accurately.

## Citation of specimen labels

Labels of all types are cited *verbatim*, unless a very large number of specimens was involved (when some repetitive information was omitted or reference is made to the original description). In cases where both sides of a label contain text, this is indicated by a '/'. Text on different labels is separated by a ';'. Names of collectors unaccompanied by 'legit' or a similar suffix are given in round brackets, even if these did not appear on the original label. Lastly, where missing pieces of text had to be inferred, these addenda are given in square brackets.

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## MORPHOLOGY

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### Early stages (Figs 1–6)

Little published information exists on the early stages of Macariini. Most Holarctic species have been reared, but the available information exists in the form of isolated descriptions of mature larvae, mostly of species of *Chiasmia* and *Isturgia*. McGuffin (1972) detailed

the information available on the Canadian fauna and Forster & Wohlfahrt (1981) on the fauna of central Europe. Practically nothing is known about the early stages of species belonging to the *Platypepla* group of genera in the study area, although a few isolated descriptions exist of species of *Narraga* and *Acanthovalva* from the Palaearctic and Nearctic regions.

### Egg (Fig. 1 a-f)

The egg of Macariini, like that of other Geometridae, is of the 'flat type', in which the longitudinal axis runs horizontal to the surface on which it is deposited. Eggs of *Acanthovalva inconspicua* (Hübner) and of four and eight species of *Isturgia* and *Chiasmia* respectively were available for study. The eggs of most species examined are elliptical and more or less oblong. The rosetta-shaped micropyle is illustrated in Fig. 1d. The egg of *C. subcurvaria* (Fig. 1c, d), however, differs in being barrel-shaped. The chorion has a reticulate, penta- or hexagonal structure in all eggs examined, though the intensity and coarseness of reticulation vary; in *C. procidata* part of the chorion is smooth. Aeropyles may be inconspicuous or raised and prominently developed. With the exception of *C. subcurvaria*, morphology of the Afrotropical species examined falls within the range illustrated by McGuffin (1972) and Salkeld (1983). In size, eggs examined ranged between  $0.56 \times 0.41$  mm and  $0.77 \times 0.57$  mm. Usually eggs are pale to medium green when laid, turning reddish or darkening prior to hatching.

### Larva (Figs 2-5)

*Platypepla* group of genera. Although being typically geometrid in having the number of prolegs reduced to two pairs – one on A6 and the other on A10, the brownish larva of *Plateopia acrobelia* differs from the generalized geometrid type by having a strongly swollen thorax, not unlike the larva of *Macaria abydata* Guenée (see Pl. 19, Fig. 3 in Holloway, 1993). When disturbed, it drops to the ground and rolls itself into a ball, resembling a fecal pellet (Staude, *pers. comm.*). The early stages of other members of the group remain unknown.

Other Macariini. Larvae are known of *Isturgia* and *Chiasmia* species only. The southern African species examined are mostly either smooth or possess only small tubercles, usually on segments A4 and A5; occasionally tubercles are more numerous, as in *C. turbulentata*. Colouration is mostly cryptic in tones of green and brown (Figs 2, 4), although the larvae of some species are brightly coloured (e.g., *C. steniata*, Fig. 5). The following lines occur: dorsal (or middorsal), addorsal, subdorsal, lateral, subventral, adventral and ventral (or midventral). In the species studied, usually not all of these are present. With the exception of the lateral line, lines are often weak and/or incom-

plete. The chaetotaxy is characteristically geometrid: presence of a fourth SV seta on A6; L1 and L2 widely separated on A1-8; seta L3 more anterior in position compared with other families (Stehr, 1987). Secondary setae are absent.

**Head.** The larval head is hypognathous; the frontoclypeus extends dorsally to nearly half the distance to the epicranial notch. The cranium is heavily sclerotized and often darkly pigmented. Six stemmata occur on the side of the head. Changes take place in cranium shape between instars, but these are minor and confined to the head capsule becoming more strongly convex in later stages. McGuffin (1972) provided illustrations of larval heads of several species. The chaetotaxy of the cranium of the first and final instar larva of *Chiasmia procidata* is as follows (setal nomenclature after Stehr, 1987):

#### Tactile Setae

(i) *Anterior group.* A1-A3 on parietal lobe. In adult larva A1, the most ventral seta, some distance from stemma 3, above antennal base; median seta A2 above A1 in front of stemma 2; dorsal seta A3 in front of stemma 1. Pore Aa dorsad of A2.

(ii) *Stemmatal group.* S1 close to stemma 4; S2 near stemma 1; S3 behind stemma 6, near centre of stemmatal semicircle. Pore Sa close to stemma 4; pore Sb absent.

(iii) *Substemmatal group.* SS1 between stemma 5 and mandible; SS2 near stemma 5; SS3 some distance from stemma 5 towards maxilla. Pores SSA to SSC not located.

(iv) *Frontal seta.* One pair of setae (F1) in centre of frons. Pore Fa mesad of F1, situated below setae in first instar and slightly above setae in final instar.

(v) *Adfrontal group.* AF1 setae ventrad of AF2; both groups situated between ecdisial line and lateral adfrontal suture. Pore AFa about midway between AF1 and AF2.

(vi) *Clypeal group.* As illustrated, with C2 ventrolaterad of C1. There are no pores associated with this group.

(vii) *Lateral seta.* On side of head above stemma 1. Pore La near and slightly below L1 but poorly defined and inconspicuous due to heavy pigmentation of cranium.

(viii) *Posteriordorsal group.* P2 close to the end of the epicranial stem; P1 some distance further down. P1 somewhat longer than P2 (but not much longer as stated in Stehr, 1987: 301). Pores Pa and Pb dorsad of and close to base of P1 and P2 respectively.

#### Proprioceptor setae

(i) *Dorsal group.* Setae very small. MD1 and MD2 between Pb and vertex; MD3 dorsad of MD2 (not illustrated). Pore MDa between MD2 and MD3 (not illustrated). Setae and pore not discernible in first instar crania at a magnification of 400 $\times$ .

(ii) *Genal group.* These small setae are situated at the lower, rear portion of the head (Stehr, 1987) but could not be located in the slide preparations made.

*Thorax and abdomen.* First and/or final-instar larvae of 11 species of *Chiasmia* and three species of *Isturgia* were available for examination. The setae of L1 larvae are somewhat trumpet-shaped and grooved, with a serrated rim. In later instars they become attenuated, with the tip terminating in a small vesicle. The chaetotaxy of L1 and L4 larvae of *Isturgia deerraria* and *Chiasmia interrupta* is:

*Isturgia deerraria:*

First instar. T1: XD1, XD2; D1, D2; SD1, SD2; L1, L2; SV1, SV2. T2–3: D1, SD1, SD2; L1, SV1. A1–5: D1, D2; SD1; L1, L2; SV1, SV2; V1. A6: D1, D2; SD1; L1, L2; subventral group of 3 setae. A7–8: D1, D2; SD1; L1, L2; SV1; V1. A9: D1, D2; SD1; L1; SV1; V1. A10: D2; SD1, SD2; CD1, CD2; L1, L3; CP1, CP2. In this instar, no ventral seta was detected on segments T1 and T2.

Fourth instar. As first instar, but with the following changes: T1: V1 present. T2–3: D2, L2, L3 and V1 present. A1: SV2 reduced; L3; SV3, SV4 present. A2–5: SV4 present. A6: L3 present; subventral group of 5 setae. A7–8: SV3 present. A10: D1 present; L2 present. Crotchets in a mesoseries.

*Chiasmia interrupta:*

First instar. T1: D1, D2; SD1, SD2; L1, L2; SV1 and SV2 arising from pinaculum; V1; additional ventral seta (?). T2–3: D1, D2; SD1, SD2; L1; SV1; V1; additional ventral seta (?). A1: D1, D2; SD1; L1, L2; SV1; V1. A2–5: D1, D2; SD1; L1, L2; SV1, SV2; V1. A6: D1, D2; SD1; L1, L2; subventral group of 2 setae. A7–8: D1, D2; SD1; L1, L2; SV1; V1. A9: D1, D2; SD1; L1; SV1; V1. A10: D1, D2; SD1, SD2; CD1, CD2; L1, L3; CP1, CP2.

Fourth instar. As first instar, but with the following changes: T1: XD1, XD2 present; SV1, SV2 separated; additional ventral seta (?) reduced. T2–3: L2, L3 present; additional ventral seta (?) reduced. A1: L2, L3 present; SV3, SV4 present. A2–5: L3 present; SV3, SV4 present. A6: L3 present; subventral group of 4 setae. A7: SV3 present. A8: SV3 present; V1 reduced. A10: CD3 present; L2 present. Crotchets unbroken (i.e., of equal length and arranged in one group).

The following trends in macarine chaetotaxy can be recognized: the setae of the dorsal (D1, D2) and subdorsal (SD1, SD2) groups, as well as the first two setae of the lateral (L1, L2) and subventral (SV1, SV2) groups are present throughout the development of both *Chiasmia* and *Isturgia* and subject to very little variation. Most variation is observed in the presence of additional lateral and subventral setae in the mature larva. *Chiasmia interrupta* and *Isturgia deerraria* both acquire the following setae during larval development:

L2 and L3 on T2–3; L3 and SV3, SV4 on A1; SV on A2–5; L3 on A6; SV3 on A7 and A8; and L2 on A10. No changes in the chaetotaxy of segment A9 occurs in either species. The pattern of chaetotaxy described for *I. deerraria* and *C. interrupta* largely corresponds to the generalized pattern provided for Canadian Macariini by McGuffin (1972). More species need to be examined to assess the taxonomic significance of the observed differences, such as the apparent absence of V1 on segments T1 and T2 in *I. deerraria*.

## Pupa (Fig. 6)

With the exception of single exuviae of *Platypepla macilenta* and *P. griseobrunnea* (broken) (*Platypepla* group of genera), only pupae of two species of *Isturgia* and seven species of *Chiasmia* were available for study. All are oblique and fairly uniform in shape and colour, being moderately stout and spindle-shaped, medium to dark brown and slightly glossy. The pupae are sparsely setose; the setae are short and confined to the dorsum of the whole body and the ventral side of the abdomen. The cremaster is well developed and in Macariini not belonging to the *Platypepla* group typically bifurcate with truncated or pointed tips frequently of differing length. By contrast, the cremaster of *Platypepla* is rhomboid, with two thin filamentous lateral processes. The cuticle of the base of the cremaster frequently exhibits a number of fine, convoluted ridges. When disturbed, the pupa is capable of moving its abdomen in a rotating manner. Pupae of certain species have been figured by McGuffin (1972).

Forbes (1948), building on earlier work by Mosher (1916), used cremaster shape to define ennomine tribes. He distinguished between a Group A, in which the cremaster ends in two spines, and a Group B, in which it ends in eight hooked setae, placing Abraxini and Macariini (as Semiothisini) in Group A. Abraxini have been proposed as the sister taxon of Macariini (McGuffin, 1987; see also section on Phylogeny). The very different rhomboid cremaster of *Platypepla* may well constitute an apomorphy not only for the genus, but possibly for the whole *Platypepla* group. It is particularly important, therefore, that more pupal material of this group is studied.

Forbes (1948) noted two further pupal characters as important for the higher classification of Geometridae. The first is the development of the ‘suture’ (Forbes’s term) separating segments A9 and A10. In many Ennominae, although not the eastern Nearctic Macariini, this ‘suture’ is strongly developed, forming a dorsal groove (a scalloped or notched posterior edge) and a lateral groove (a triangular or oblique depression). In the Afrotropical pupae, and in exuviae of Macariini examined, I found this suture to be unmodified as in Nearctic members of the tribe. Secondly, segment A5 may develop what Forbes (1948) termed a spiracular

furrow (a shallow, usually unsculptured and shining depression crossing or lying immediately in front of the spiracle) or a flange-plate (i.e., a sharp vertical ridge lying well in front of the spiracle, preceded by a deep groove, which is frequently sculptured at the bottom). While a flange plate is absent in the macariine pupae studied, confirming Forbes's findings, the development of a spiracular furrow is apparently inconsistent within Macariini. It is absent in *Platypepla*, weakly developed in *Chiasmia furcata*, *C. interrupta*, *C. simplicilinea*, *C. trizonaria* and *C. turbulentata* and well developed in *Isturgia deerraria*, *I. spissata* and *Chiasmia subcurvaria*.

## Adult – comments on skeletal morphology

### Head (Figs 7, 8)

The vestiture of the cranium in Macariini is composed of elongated, recumbent scales covering the vertex and the antennal scapus. Scales on the vertex frequently differ in colour from other areas of the head and are often paler. The frons is usually smooth, much less densely scaled and more or less convex in most species. It bears a conspicuous horseshoe-shaped prominence in two species of the *Chiasmia nubilata*-group and the two probably most primitive members of *Chiasmia*, *C. calvifrons* and *C. puerilis* (Fig. 8), while a simpler, scaled cone is present in several more derived species-groups of the same genus. These structures thus probably arose independently in several macariine lineages.

The chaetosemata are not of the shape typically occurring in macrolepidoptera (i.e., a discrete cuticular patch with bristles or narrow scales situated behind each antennal basis) but were described by Forbes (1948) as 'transversely elongate' (Fig. 7). This condition constitutes a synapomorphy of Macariini, although it was apparently secondarily lost in some derived taxa, including the Oriental genera *Iridoplecta* Warren and *Lampadopteryx* Warren. Transversely elongated chaetosemata also occur outside the Macariini in *Scardamia* Guenée (Scardamiinae) (Holloway, [1994]).

The structure of the antennae varies considerably in the two subtribes, and they may be plumose (i.e., bipectinate with very long and delicate rami), bipectinate with pectinations of varying length and thickness, but shorter than in the plumose type, serrate, or ciliate. While many of the derived species of *Chiasmia* have ciliate antennae, there are exceptions and male antennal structure may vary even within species-groups (e.g., *C. procidata*- and *furcata*-group).

The thickly scaled labial palpi are prominent, varying in length between one and two times diameter of eyes. In the majority of species they are obliquely porrect and three-segmented with the third segment small. The max-

illary palpi are very small, one-segmented and completely hidden beneath scales. The proboscis is well developed and not scaled at its base.

## Thorax

The thorax of most species is slender as in many geometrids though it may be robust as in species of the *Isturgia supergressa*-group.

**Legs.** The macariine leg is typically geometrid, being long and slender with a covering of smooth scales. The tarsi are also long, and the tibial spur arrangement is 0–2–4. Modifications occur only in the male hind tibia of many species of *Isturgia* and *Chiasmia* where it may become dilated and/or develop a lateral groove which may be lined with appressed, fine hairs or bear a hair-pencil.

**Wings.** The wings of most Macariini are broad relative to body size while those of some members of the *Platypepla* group of genera, such as *Platypepla*, are narrower. The apex of the fore wing may be rounded, pointed or scalloped. The termen of the hind wing is slightly attenuated in many species, giving them a weakly 'tailed' appearance, but is also frequently rounded or, more rarely, crenulated. The wings of most species are smooth-scaled; in *C. nubilata* and *C. extrusilinea*, a patch of raised scales indicates the position of the (absent) fovea. The fovea, if present, is formed by the sigmoid base of A1 and demarcated dorsally by a recurved process of CuA. It usually contains a corrugated membrane of uncertain function. The distribution of this structure exhibits no obvious taxonomic pattern. It is present in most Macariini, although in some instances incompletely formed.

The wing pattern of members of the *Platypepla* group of genera is rather simple. Usually it consists at most of basal, median and postmedian lines on fore wing and a postmedian only on hind wing on a fairly uniform and frequently ochreous background. Other Macariini display, however, a great variety of patterns. The underside pattern may consist of the same elements as on the upperside and simply be more or less intense, or its composition may be entirely different. In Costa Rican species of *Chiasmia* and *Seniothisa*, Scoble (*pers. commun.*) found the pattern on the underside to be much stronger, though otherwise similar to the upperside. The various wing pattern elements referred to in the text are illustrated in Fig. 9. Discal spots are present in most macariines, although they may be inconspicuous.

Venetion throughout the tribe is fairly constant and of the normal ennomine type, showing a reduction of M2 in the hind wing (Figs 10–18). The observed variation concerns mostly Sc and R in the fore wing and the development of vein 2A in the hind wing. As already pointed out by Capps (1943), differences in ennomine venation do not accurately reflect relationships as variation occurs even between closely related

groups. This observation was confirmed by Janse (1932) who illustrated some of the variation found in South African species of *Chiasmia* (cited as *Semiothisa*) and *Isturgia* (cited as *Tephritis*). The venation of the different genera is described in detail in the systematic section.

Generally, Sc tends to anastomose with R1 or R1+2 in the fore wing; the anastomosis may be short or long. The radial veins are variously stalked: combinations include R2–5 stalked with R2 and R3 being coincident; R2–4 stalked with R3 and R4 being coincident; and R3–5 stalked, the stalk usually arising from near end of cell. Veins 1A and 2A may be separate for up to one-third of the length of 1A+2A before they fuse, or may anastomose for the entire length.

In the hind wing, Sc+R1 and Rs are approximated or meet for a short distance but do not anastomose. Vein 2A is absent or only indicated by a fold. Where present, it does not reach the wing margin (Figs 10–18).

## Abdomen

Coremata are not evident in the group; however, males of some species of *Milocera* (*Platypepla* group of genera) possess groups of elongated, hair-like scales on either side of the octavals. Their function is not clear, and an association with scent distribution, probably for the purpose of courtship, is speculative. Males of several genera of Macariini frequently have a transverse comb of setae on sternum A3. Several species of *Milocera* show a group of enlarged scales in this position, which may be the unmodified homologue of the setal comb found in higher macariines.

Octavals (paired, hairy or scobinate caudal processes of the posterior margin of segment A8 of the male) occur widely throughout the tribe. Their presence or absence, and particularly their shape, are frequently of diagnostic value at species and species-group level. Compared with other Macariini, the octavals of members of the *Platypepla* group are simpler in structure and weakly sclerotized. Most are either broadly w-shaped or consist of a narrow, sclerotized lip, as in species most species of *Platypepla* or *Plateoplia acrobelia* (Wallengren).

Where present, the octavals of Macariini are small to very large and usually arcuate or furcate, with rounded or pointed tips. They may be shallow or deeply excised, and in some species bear a fringe of fairly long hairs. Octavals are absent in both species of *Chelotephritis*, the members of the *Isturgia supergressa*-group previously placed in *Enconista*, as well as some other species-groups of *Isturgia*, and have been secondarily lost in some species of *Chiasmia*.

The tympanal organs of Macariini are typically geometrid in structure (e.g., Kennel & Eggers, 1933; Cook & Scoble, 1992). Cook & Scoble (1992) first recorded an asymmetrical extension of the ansa, a

sclerotized arm which curves over the tympanum and is not found outside the Geometridae, in *Isturgia pulinda* (Walker); this extension is also present in the African species of the *disputaria*-group. No variation of the ansa between the *Platypepla* group of genera and other Macariini was found. The tympanic lacinia, a sclerotized plate perpendicular to the ansa, usually semicircular in Ennominae and thought to protect the tympanum (Cook & Scoble, 1992), was found in many species of *Isturgia* and *Chiasmia*, but not among the *Platypepla* group of genera.

## Genitalia

The ventral aspect of the male and female genitalia of a representative of the *Platypepla* group of genera and a 'horned' representative of the tribe is presented in Figs 19 and 20 respectively.

### Male (Figs 19, 500–744)

The uncus is always well developed and may be attenuated (e.g., Fig. 538), triangular (e.g., Fig. 507) or dome-shaped (e.g., Fig. 594). While the attenuate condition is confined to the *Platypepla* group of genera, a dome-shaped uncus, with or without enlarged setal 'horns', is typical of many other Macariini. I call a modification of the latter type 'mitre-shaped' (e.g., Fig. 575); this type is characteristic for the *Isturgia presbitaria*-group.

A gnathos may be present but has apparently been secondarily lost several times within the *Platypepla* group. Where present it may be cingulate (i.e., supported by fairly strong arms) and then have the medial element either upright or drooping (e.g., Figs 507, 557), or alternatively be deeply emarginate with thin arms (e.g., Fig. 594). As a deeply emarginate gnathos is typical for higher macariines such as *Chiasmia*, I consider it to be the apomorphic condition.

The valve structure of Afrotropical Macariini, and particularly the *Platypepla* group, shows a considerable degree of variation (Figs 500–544 (*Platypepla* group of genera); Figs 545–744 (other Macariini)). In the *Platypepla* group, costa and sacculus are usually more completely separated than in other Macariini. However, the valvae in some taxa belonging to the latter group, such as *Oxymacaria* and *Iridoplecta*, in which sacculus and/or costa have been secondarily reduced to a narrow sclerotized bar, may at first appear to be closer to the platypepline condition. The valvula (i.e., the central region of the valva, lying between costa and sacculus) is not modified in the *Platypepla* group, and is occasionally developed as a small 'hump' in other Macariini.

### Female (Figs 20, 745–968)

The structure of the female genitalia in the *Platypepla* group of genera differs from that of other Macariini. In

the former, the bursa copulatrix is usually small relative to the size of the abdomen which houses it. It is frequently short and rounded, although a pear-shaped (pyriform) bursa, occurring widely outside the *Platypepla* group, is also found in *Plateoplia*. In the majority of platypepline genera, the inner surface of the bursa is inwardly partly or entirely covered with denticles or spines of varying size (institute condition of bursa copulatrix (Janse, 1932)). The stellate signum typical of most other Macariini does not occur in the *Platypepla* group in a fully developed state; it is small in *Narraga*, whereas in *Plateoplia acrobelia* the bursa wall bears a small, sclerotized tooth. The structure of the ductus bursae varies considerably between genera and is often difficult to interpret, but a true antrum (posteriormost part of ductus when more heavily sclerotized and differentiated from the remainder of the ductus (Tuxen, 1956)) is apparently not present. The sterigma (i.e., the entire complex of sclerotizations surrounding the ostium bursae and consisting of lamella antevaginalis and l. postvaginalis) is often elaborate, as in *Platypepla* and *Plateoplia*.

Other Macariini, by contrast, display the more familiar structure of female genitalia illustrated in McGuffin (1972). The bursa copulatrix is more or less pear-shaped or takes the form of a more or less strongly elongated tube. In the ductus, the antrum is clearly distinguished from the anterior membranous part, which is often finely ribbed and somewhat more heavily sclerotized posteriorly. The corpus bursae is mostly membranous with a stellate signum of variable (and occasionally varying) size. Deviations from this pattern include partial or total reduction of the signum and modifications of the body wall, which may be finely spiniferous (*C. inouei*, Fig. 903) or tough and leathery and partly spinose (Afrotropical members of the *I. supergressa*-group, e.g., Fig. 781).

In Macariini, as a rule, genitalic structure provides constant diagnostic characters at the species level. In the female genitalia of certain taxa (*C. furcata*, *C. brongusaria*, some species of the *I. disputaria*-group) marked variation is exhibited in size and shape of the bursa and size of the signum. These species are also characterized by considerable variation in adult size and wing pattern.

## BIOLOGY

### Adult

The moths are typically dull and cryptic in colour, with various shades of ochre, brown and grey being dominant. The species of the *Chiasmia multistrigata*-group and *Isturgia devecta* resemble tree bark, on which some species have been observed to rest (*pers. obs.*). Most

species rest with their wings wide open, sometimes held up at a slight angle from the surface. An exception are the species of the *C. procidata*-group which hold their wings folded over their backs. Many species stay in the vicinity of the foodplant and are easily flushed from the vegetation during the day. Although most macariines are nocturnal, some species of *Isturgia* have been reported as being diurnal, flying in bright sunshine (Rebel, 1931).

### Phenology

Macariini occur in a wide range of biomes (see section on Biogeography), from the deserts and semideserts in south-western Africa and in the north of the continent (although they do not appear to be elements of the desert biome proper) to the rainforests of Central and West Africa and, at the other extreme, the cold and humid coniferous forests of the northern hemisphere, where some species approach the Arctic circle. In the study area, the majority of species are associated with the savanna biome, although there exists a strong forest element. In the Oriental and Neotropical regions, most macariines appear to be associated with forests.

In the Afrotropical region, patterns of life history are related more to patterns of rainfall than to changes in temperature. Therefore the influence of precipitation on macariine activity patterns appears to be indirect and caused by the leaf fall of *Acacia* species and other food plants in autumn and early winter. Many species are bivoltine or even multivoltine, as long as the foodplant remains in a suitable condition for the larvae. In the evergreen forests of Central and West Africa, many species are continuously brooded, with moths being found during both the dry and rainy season.

### Seasonal variation

A number of Afrotropical Macariini show seasonal variation in wing pattern. *Chiasmia streniata* possesses a much paler form, f. *amandata* (Walker), mostly observed during the winter months between April and September in southern Africa (Janse, 1932). The closely related *C. parastreniata* sp. n. from Tanzania is known only from two males that can also be assigned to a darker and a paler form. The darker, more strongly patterned specimen was collected in mid-March and the lighter one in April. More material of this species is required to decide whether or not these two specimens represent seasonal forms.

In Zimbabwe, *C. kilimanjarensis* occurs in the darker, more clearly marked nominotypical form (Figs 385, 386) during summer (i.e., from December to April), while the paler f. *mundipennis* (Warren) (Fig. 387) occurs through winter (May to August) and spring (September to November).

Adults of *Chiasmia nana* occur in a pale, yellowish-ochre and a darker, greyish-brown form. In material of

this species collected from the same locality in Zimbabwe (Aberfoyle, 18°30'S 32°50'E) over several years, the late N.J. Duke (*pers. comm.*) noted that specimens taken in October 1992, during a period of severe drought in the area, belonged to the darker form, while those collected in other years were pale. Similar seasonal variation exists in *Chiasmia semitecta* and *C. umbrata*. As in the examples mentioned above, adults of these species are generally paler and show plainer markings during the dry season in southern Africa.

## Geographical variation

Considering the large number of species and the wide distribution of many Macariini, the group exhibits little geographical variation: in this study, only 20 subspecies are recognized among a total of 267 species; forms appear to be exclusively seasonal and are restricted to the examples discussed above.

Two areas have produced the most striking geographical variation: Madagascar and the south-west arid zone of southern Africa, including the north-western Cape Province and the greater part of Namibia.

In Madagascar, the observed variation is mostly due to isolation since the Cretaceous (see section on Biogeography). Species of *Chiasmia* are represented in Madagascar and the Comoro Islands with four endemic subspecies: *Chiasmia streniata arata* (Saalmüller), *Chiasmia separata conjugata* Herboulot, *C. umbrata juvenilis* (Herboulot) and *C. simplicilinea pagenstecheri* (Herboulot). With the exception of *C. separata conjugata*, which is of a more yellowish-ochre colouration than the nominate subspecies, but of similar size, the Madagascan subspecies are clearly smaller than those occurring on the mainland, but otherwise are marked similarly. Why these subspecies should be smaller than their counterparts on the mainland is not clear, especially since adults of closely related Madagascan species do not exhibit a similar reduction in size.

Reduced adult size is observed also in several Macariini occurring in the arid western Cape Province (Namaqualand, Richtersveld) and Namibia (southwest arid zone), although the reasons for this phenomenon are not understood. For example, the very widespread and variable *Chiasmia brongusaria* (Walker) is represented in this area by a smaller and much darker subspecies, ssp. *exoscoides* (Prout). In the rest of its range, which extends from the Cape Province through eastern Africa, reaching Ethiopia in the north, this species has not developed other subspecies.

By contrast, the even more widely occurring and equally variable *Isturgia deerraria* (Walker) occurs in very pale individuals in this area, notably the arid areas of south-west Namibia. Since these moths rest on the ground with outstretched wings, paler specimens would be better camouflaged on a sandy substrate. The opposite development can be observed in *Chiasmia*

*procidata*, which in the deserts of Saudi Arabia is represented by the very dark subspecies *fumida* (Wiltshire). It is not clear what selective advantage, if any, these dark populations enjoy.

## Melanism

This phenomenon is rare in Macariini. In the Afrotropical fauna, totally melanistic specimens are known only from *Isturgia deerraria* and *Chiasmia simplicilinea*, although partly melanistic specimens are known from a number of other species, e.g., *Platypepla flava*, *Isturgia spissata* and *Chiasmia diarmodia*.

In *C. simplicilinea*, the frequency of melanism varies drastically between geographical areas. Melanistic examples are unknown in many areas and rare in others, but may make up to 50% of a population (N.J. Duke, *pers. comm.*). In southern Africa, the highest occurrence of melanism in this species is found in populations from the mountainous areas of the east, especially the Drakensberg range from Swaziland to Lesotho, which receive high levels of rainfall and low temperatures.

## Lachrymophagy

Lachrymophagous behaviour in Macariini has been reported so far from the Oriental and Afrotropical regions and tropical America (Büttiker, 1964, 1970, 1973). The habit was noted first in the Oriental species *Chiasmia fasciata* (Fabricius) and *C. myandaria* (Walker), which have a wide range of mammalian hosts in Thailand (Büttiker, 1964). Büttiker (1979) reports anthropophilic behaviour of *Isturgia disputaria* (Guenée) (as *Tephrina*) in Saudi Arabia.

In southern Africa, the only information published about lachrymophagy refers to *Chiasmia inaequilinea* (Warren), which has been observed to frequent the eyes of sheep in the Karoo (Büttiker, 1973; Büttiker & Whellan, 1966) and cattle. The species has not been implicated conclusively in the transmission of ophthalmic diseases. There is no published information on macariines visiting the eyes of wild Artiodactyla, Perissodactyla or Proboscidea in Africa, although these are probably the natural hosts. It is not known whether *C. inaequilinea* actively causes lacerations or discomfort to its hosts.

## Oviposition

No account of macariines ovipositing under natural conditions is available, and the following observations were made on captive females of species of *Chiasmia* (*b. brongusaria* (Walker), *furcata* (Warren), *interrupta* (Warren), *procidata semispurcata* (Walker), *s. simplicilinea* (Warren), *trizonaria* and *turbulentata*) and *Isturgia* (*catalaunaria* (Guenée), *deerraria* (Walker) and *spissata* (Walker)). The eggs are deposited singly, in twos or in small groups over a period of

several days and glued rather firmly to the substrate (tissue paper or leaves of the food plant). Since macariine ovipositors are comparatively short it appears likely that, in the wild, eggs are deposited on leaves or branches of the foodplant, rather than inserted into crevices. The eggs take approximately 7 days to hatch at 20°–25°C. Imminent eclosion of the larva is indicated by a change of colour. Although no attempt was made to determine egg load in different species, in *C. procidata semispurcata* and *I. deerraria*, which oviposit freely in captivity, their number varied between 100 and 200.

## Larva

For this study, 12 species of *Chiasmia* (*b. brongusaria*, *contaminata*, *trizonaria*, *furcata*, *inquinata*, *interrupta*, *m. multistrigata*, *procidata semispurcata*, *s. simplicilinea*, *s. subenvaria*, *turbulentota*, *u. umbrata*) and three species of *Isturgia* (*catalammaria*, *deerraria* and *spissata*) were reared in captivity. Some of these (*C. contaminata*, *inquinata*, *m. multistrigata*, *u. umbrata*; *I. catalammaria*) failed to complete their development, probably because the correct foodplant was not available or of poor quality, as in the case of *Albizia gummifera*, the foodplant of *Chiasmia contaminata*. The remaining seven species readily accepted *Acacia karroo* Hayne.

The larvae hatched after 3 to 8 days. Depending on species, the freshly hatched larva may or may not consume the egg shell. The young larvae of all African Macariini studied are peripatetic for a while, a behaviour also reported from the Bornean *Chiasmia emersia* (Walker) (Holloway, [1994]). Feeding on the leaves of the foodplant commences after about 24 hours. Macariine caterpillars feed openly on the foliage of their foodplant at night (*pers. obs.* and Wehrli, 1940). It is not known to what extent feeding occurs during the day. *Isturgia deerraria* (Walker) has been known to defoliate *Acacia mollissima* trees in Morocco (Rungs, 1954).

## Larval foodplants

### *Platypepla* group of genera

The only foodplant records from the Afrotropical region are of three species of *Platypepla* Warren that have been reared on *Loranthus* spp. (Loranthaceae), the African mistletoe (Table 1). In the Palaearctic, larvae of *Narraga fasciolaria* (Rottemburg) have been recorded on *Artemisia campestris* (Compositae) (Koch, 1984). The larva of 'Semiothisa' *eremita* (Guenée) from the Nearctic region (which is probably referable to *Acanthovalva*) feeds on *Tephrosia virginiana* (L.) Pers. (Papilionoideae).

### Other Macariini

In the Afrotropical region, most Macariini are associated with leguminous trees, notably those belonging to

the large genus *Acacia*. In addition, they have been recorded feeding on species of *Albizia*, *Rhynchosia*, *Entada*, *Brachystegia*, *Newtonia* and *Hippobromus* (Table 1).

A similar picture emerges for the Oriental region. Holloway ([1994]), quoting various authors, lists species of *Delonix*, *Acacia*, *Albizia*, *Bonhinia*, *Intsia*, *Mimosa*, *Cassia* and *Paraserianthes* (all Fabaceae) as macariine hosts. Genera from other plant families on which macariine larvae have been reared include *Tomarix* (Tamaricaceae), *Terminalia* (Combretaceae) and *Elaeagnus* (Elaeagnaceae).

In contrast to this, the Macariini of the northern hemisphere utilize several unrelated groups of food plants. While some feed on the mostly shrubby or herbaceous Fabaceae of the region such as *Genista*, *Trifolium*, *Medicago* or *Hippocratea*, others feed on deciduous trees, including *Salix*, *Betula*, *Alnus* and others. A third group feeds on conifers (*Picea*, *Pinus*, *Juniperus* and others) (McGuffin, 1972; Forster & Wohlfahrt, 1981).

## Significance of shifts in host-plant preference

Legume-feeding appears to be a ground-plan character of Macariini, as it is found among primitive representatives of both the *Platypepla* group of genera (see above) and other Macariini, and is shared with their likely sister-group Cassynini (see section on Phylogeny). The habit of feeding on Loranthaceae in *Platypepla*, on *Ximenia* (Olacaceae) in *Plateoplia* (and on Asteraceae in the northern hemisphere) therefore is a derived trait, as is utilization of other unrelated plant groups, e.g. Sterculiaceae and Euphorbiaceae, by some other Macariini.

During the process of spreading to the Palaearctic and Nearctic (see section on Biogeography), Macariini underwent changes in host plant selection. Firstly, although Fabaceae are well represented in the northern hemisphere, taxonomic composition of the group differs from that of the southern hemisphere, and most genera represented there are shrubby or herbaceous.

Secondly, the ability to utilize non-leguminous deciduous trees and shrubs and, as a next step, conifers, would mean that the group could greatly extend its geographical range. A recent paper by Fraser & Lawton (1994) investigated the phenomenon of host-range expansion by British moths (including *Chiasmia alternaria* and *C. brunnearia*) onto introduced conifers. They found that species with the capacity to shift to conifers attack a wider range of angiosperms than do species lacking this capacity, and that their original hosts tend to be woody trees and shrubs. Furthermore, ecological opportunity (i.e., a more or less close spatial relationship between old and new host) and certain life-history traits appear to play an important role. These

findings may explain the observation that in addition to their main hosts (deciduous trees and conifers), Canadian Macariini utilize a wide range of shrubs belonging to several families, including *Arctostaphylos* and *Vaccinium* (Ericaceae), *Gleditsia* (Fabaceae), *Chrysanthemum* (Asteraceae), *Ribes* (Saxifragaceae), *Potentilla* (Rosaceae) and *Myrica* (Myricaceae).

## Systematic overview of plant genera utilized

Fabaceae (Mimosoideae): *Albizia* Durazz.; *Acacia* Wild.; *Prosopis* L.; *Newtonia* Baillon; *Euitada* Adanson; *Aspalathus* L.

Fabaceae (Caesalpinoideae): *Erythrophleum* R. Br.; *Brachystegia* Benth.; *Peltophorum* Walp.

Fabaceae (Papilionoideae): *Rhynchosia* Lour.; *Calicotome* Link.; *Dorycnium* Mill.; *Genista* L.; *Ulex* L.; *Glycyrrhiza* L.; *Tephrosia* Pers.; *Mundulea* Benth.

Anacardiaceae: *Rhus* L.

Sapindaceae: *Hippobromus* Ecklon & Zeyher

Celastraceae: *Pterocelastrus* Meissner

Asteraceae: *Helichrysum* Mill.

Tamaricaceae: *Tamarix* L.

Sterculiaceae: *Sterculia* L.

Euphorbiaceae: *Mallotus* Lour.

Loranthaceae: *Moquinella* Balle; *Tieghemia* Balle

Olacaceae: *Ximenia* L.

## Pupa

Generally, pupation takes place in a flimsy cocoon close to the surface, although the larva of *Plateoplia acrobelia* did not spin any cocoon in captivity, suggesting pupation in the soil under natural conditions (Staude, pers. comm.). In the *Isturgia* and *Chiasmia* species bred during this study, the pupal stage lasted for 6 to 12 days.

## Natural enemies

Holloway ([1994]) reports high mortality of *C. translineata* larvae due to parasitic Hymenoptera and spiders, and Wehrli (1940) mentions high rates of parasitism of *Isturgia berytaria* by the ichneumonid wasp *Cymodusa antennator* Hlg. I found that in a sample of around 50 larvae (mostly of *Chiasmia b. brongusaria* and *C. s. simplicilinea*) collected in April 1991 in the Pretoria area, about half were parasitized by a species of *Casinaria* (Ichneumonidae: Porizontinae).

In Morocco, Rungs (1954) noted infection of the pupae of *Isturgia deerraria* resting in the soil by a fungus of the genus *Isaria*, while adult larvae and moths were infected by *Empusa sphaerosperma* (Fries.) Thaxter, 1888 (Rungs, 1954). While the *Isaria* infestations did not noticeably affect populations of *I. deerraria*, mortality caused by *Empusa* was significant. During times of high larval densities, the tachinid *Sturnia imberbis* Wied. was found to be an important parasitoid of the Moroccan populations of *I. deerraria*.

## BIOGEOGRAPHY

The larvae of Macariini are exclusively phytophagous, with many host plants belonging to the genus *Acacia* (Fabaceae). Fifty-two species of *Acacia*, including several naturalised taxa, have been recorded from southern Africa (Coates Palgrave, 1988). Some of these have a fairly limited range, while others, notably *Acacia karroo* Hayne, occur throughout the greater part of the subregion. Species of *Acacia* are absent only from a narrow strip of desert north of 28°30'S along the Atlantic coast of Namibia and several patches in the Kalahari of Botswana (Coates Palgrave, 1988). The distribution of *Acacia* is probably the single most important factor governing the distribution of Macariini in the Afrotropical region: the overall distribution of the tribe in southern Africa is illustrated in Fig. 1039; the absence of records from south-west Namibia south of 25°S, the central Great Karoo and southern Moçambique are due to sampling bias.

Although Macariini utilize at least 26 genera of food plants belonging to 9 families, within the study area (Table 1), there are few examples where the distribution of macariine species matches exactly that of their hosts, as most of the very widespread macariines are comparatively polyphagous and able to utilize several genera. In the following examples of Macariini with a localized distribution, food plant occurrence appears to be the main limiting factor:

*Albizia gummifera* (Mimosoideae) has been identified as the host plant of *Chiasmia contaminata*. In southern Africa, both species are associated with high altitude forest in the escarpment area of eastern Zimbabwe (Coates Palgrave, 1988).

*Newtonia* Baillon (Mimosoideae) is a small genus with only two southern African representatives. *N. buchananii*, the host plant of *Chiasmia getula*, occurs in wet evergreen forests on the border of Zimbabwe and Moçambique, to which the moth is also restricted.

Species of *Brachystegia* (Caesalpinoideae) are largely restricted to tropical Africa, although eight species occur south of the Zambezi (Coates Palgrave, 1988). *B. spiciformis*, the food plant of *Chiasmia kilimanjarensis*, is widely distributed in Zimbabwe and south-eastern Moçambique. The Zimbabwean ranges of the two species are well correlated, although *C. kilimanjarensis* does not occur in the lowveld of Moçambique (Fig. 1013), providing an example of incomplete overlap.

*Pterocelastrus tricuspidatus* (Celastraceae) has been recorded as a food plant of *Isturgia exerraria*. However, the distribution of the two species is coincident only along the south coast of the Cape Province (Fig. 981; Coates Palgrave, 1988), so that *exerraria* must be able to use other hosts as well.

*Helichrysum* Mill. is a very large genus of small

succulent Asteraceae; 244 species occur in southern Africa (Arnold & de Wet, 1993), mostly in the Cape Province and Natal. *H. triplinerve* is the food plant of the Madagascan species *Chiasmia orthostates*. There are no records of *Helichrysum*-feeding Macariini from southern Africa, but according to Duke (*pers. comm.*) the plants are common in the fynbos habitat of *Chiasmia semitecta*, which belongs to the same species group.

Species of *Loranthus* (*sensu lato*) (Loranthaceae) are climbing parasites on a wide range of host plants. The 59 species formerly placed in *Loranthus* Jacq. were recently assigned to no fewer than 11 genera (Arnold & de Wet, 1993). Loranthaceae are food plants of the platypeline genus *Platypepla* (see Table 1). A comparison of the known range of this genus in southern Africa shows that *Platypepla spurcata*, *P. persubtilis* and *P. flava* are widely distributed, while *P. loranthiphaga*, *pseudospurcata* and *macilenta* are much more local (Figs 974–976). However, as no information is available about their host plant specificity, no inferences can be made about the extent to which host plant ranges limit distribution of the moths.

## Historical biogeography

### *Macariine faunas of southern African biomes*

The use of extant animal distributions to define zoochoria (i.e., the boundaries of zoogeographical regions) is beset with a number of difficulties. Foremost among these are the mobility of animals, which renders biome delimitation difficult, and the selection of taxa to be included. While there is agreement that dominant life forms should be used to define biomes (see review in Rutherford & Westfall, 1986), workers will tend to concentrate on distribution patterns of their study group, and the resulting zonations are often contradictory (Rutherford & Westfall, 1986; Werger, 1978).

A number of zoogeographical divisions of southern Africa have been proposed in the past. Werger (1978) presented a review of the biogeography and ecology of the subregion, with accounts of many invertebrate groups. In this work, Pinhey (1978) provided comments on the lepidopterous fauna (mostly butterflies) associated with different vegetation zones and concentrated on identifying species considered typical for an area, particularly endemics, as well as their foodplants, but did not provide an historical analysis. The need for an analysis of the distribution of dominant elements of zoocoenoses, rather than of absence or presence at species level stressed by Rutherford & Westfall (1986), had in part been achieved in the contribution by Endrödy-Younga (1978). Based on the distribution of various coleopterous taxa, particularly flightless Tenebrionidae, he proposed a zoogeographical zonation of southern Africa south of 15° into seven areas (Cape Zone, Mountain Zone, South-western Zone, Central Arid Zone, Trans-Botswana Transitional area and Tropical subregion). This zonation

resulted from analysis of distribution patterns of several lineages (genera, tribes and subtribes), and shows remarkable congruence with the phytoclimata (i.e., the boundaries of phytogeographical regions) proposed by Rutherford & Westfall (1986).

As Macariini are entirely phytophagous in their larval stage, I summarize their distribution under phytogeographic headings. Several attempts have been made in the past to establish a classification system for the major floristic zones of southern Africa. In 1953, Acocks published a first classification of the veld types of South Africa in which he distinguished seven types with seventy subcategories; revised editions of this important work were published in 1975 and 1988.

Rutherford & Westfall (1986) adopted the seven major life zones or biomes of Acocks based on the dominant vegetation types, but greatly restricted the number of subcategories. The biomes recognized were Desert, Forest, Fynbos, Grassland, Nama-Karoo, Succulent Karoo and Savanna. This arrangement was adopted for analyzing distribution patterns of Macariini.

The **Desert Biome** in southern Africa extends as a broad coastal belt between approximately 17°S and 29°S along the Atlantic coast from southern Angola to the northernmost Cape Province, either as rock or sand desert. The Namib comprises most of the sand desert of the subregion. The topography of the gently sloping coastal plain, most of which is below 1000 m a.s.l. is broken by a sea of sand dunes up to 300 m high in the south, and by some inselbergs, mainly in the north (Rutherford & Westfall, 1986). The climate is characterized by greatest summer aridity and mean annual rainfall between 13 mm in the west to 70 mm along the inland margin. The Namib is among the most ancient ecosystems in southern Africa, dating back to the Tertiary (van Zinderen Bakker, 1978), and harbours many endemic taxa; however, the four macariine species which penetrate this region do not belong to the desert biome proper but occur along the Kuiseb and Swakop rivers where some species of *Acacia* form part of the water course vegetation.

The **Forest Biome** is by far the smallest biome in southern Africa. It is most extensive in the southern Cape Province (Knysna Forest), although numerous smaller patches are distributed in areas of high rainfall along the eastern escarpment and on the eastern seaboard in both grassland and savanna biomes (Rutherford & Westfall, 1986). The biome is limited to areas with mean annual rainfall greater than 525 mm with strong winter rainfall and greater than 725 mm with strong summer rainfall. The macariine fauna of the subtropical and tropical coastal forests of Natal and Moçambique and the afromontane forest patches of the Knysna forest and the escarpment show a strongly differing composition. A number of species which are confined to lowland forest in South Africa are found in savanna habitats in Zimbabwe; these include mostly tropical elements.

The **Fynbos Biome** occurs in the south-western and southern Cape Province, where it corresponds largely to the Cape Floristic kingdom. The topography of this zone is varied, and includes mountains and lowlands as well as coastal areas. The vegetation, which is dominated by Proteaceae, Ericaceae and Restionaceae, consists of open to closed, grassy, dwarf-shrubby, shrub/woodland and usually does not exceed 3 m in height (Rutherford & Westfall, 1986). The Cape Biome (*sensu* Endrödy-Younga, 1978) which, apart from the fynbos comprises elements of afromontane forest and succulent Karoo, is recognized as one of the oldest biomes in southern Africa (van Zinderen Bakker, 1978) and, like the Namib desert, has many endemic plant and animal taxa. With six species, the macariine fauna of this interesting region is small, but contains several primitive endemics. The fact that some of these macariines are not restricted to the fynbos but are shared with the neighbouring forest and Karoo biomes supports the notion of a Cape Biome that is defined by its geographic position, rather than dominant vegetation type.

The **Grassland Biome** is found mainly on the high central plateau of South Africa, in inland areas of the seabord of Natal and in some mountain areas of the south-eastern Cape Province. The biome lies within the summer rainfall area with mean annual precipitation between 400 and 2000 mm (Rutherford & Westfall, 1986). Due to the absence of their foodplants in most of the biome, there are no true grassland macariines, but some species associated with the Main Karoo penetrate the grassland of the Free State fairly deeply, as do some generalist savanna elements from the north.

The **Main or Nama-Karoo** biome is concentrated on the central plateau of the Cape Province, the south-western Free State and the southern interior of Namibia, with smaller extensions in the eastern Cape interior, Lesotho and other areas. It consists mainly of extensive, even, undulating plains, interspersed with hills and, occasionally, mountains. Height above sea level ranges from 500 to 2000 m, with most of the area lying between 1000 and 1400 m (Rutherford & Westfall, 1986). The biome is limited to strong summer, summer and even rainfall areas; mean annual rainfall ranges from circa 120–500 mm. The vegetation has been described as grassy, dwarf shrubland (Edwards, 1983; Rutherford & Westfall, 1986). Few Macariini occur, but these include several endemic or near-endemic taxa (*Chiasmia castanea*, *C. tristis*, *C. brunnescens*).

The **Succulent Karoo Biome**, which has also been characterized as 'winter rainfall karoo', derives its name from the largely succulent character of the vegetation. This biome occurs mostly west of the western escarpment from the Lüderitz district in Namibia through the western belt of the Cape Province, and inland of the Fynbos Biome to the Little Karoo (Rutherford & Westfall, 1986) in areas of even, winter and strong

winter rainfall areas with mean annual precipitation between 20 and 290 mm. Trees are rare, and the macariine fauna of the biome includes only two species, neither of which is endemic (*P. griseobrunnea*, *I. exerraria*).

The **Savanna Biome** is by far the most extensive biome in southern Africa, covering 46.2% of the total land area. It extends from north of 22°S into central Namibia, Botswana, the higher rainfall areas of the northern Cape, the northern two-thirds of the Transvaal, the lower altitude areas of the north-western Free State, Moçambique, central and east Swaziland, Natal and the eastern Cape Province, and certain belts in the southern Cape (Rutherford & Westfall, 1986). Throughout this range the character of the savanna biome varies greatly with the development of the upper layer of woody plants, which can be widely spaced or attain a canopy cover of 75% (Edwards, 1983; Rutherford & Westfall, 1986). Most of the biome occurs in summer rainfall areas. The altitudinal distribution of savanna varies between several hundred and 2000 m. Macariini are very diverse within this area and show several distribution patterns. The following categories are recognized:

– **Savanna generalists:** species which occur throughout the greater part of the savanna biome, irrespective of aridity or temperature. Available foodplant records indicate that larvae of these species utilize either widely distributed hosts (e.g., *Acacia karroo*) or are adapted to a range of foodplants. It is not surprising therefore that this group does not include species endemic to southern Africa.

– **Lowveld species:** these are confined to the frost-free lowveld savanna of the Transvaal, Natal, and Moçambique. In these areas, the increased temperature and higher rainfall compared with the interior plateau allow for an influx of subtropical and tropical taxa. Of the ten species in this category, five (*P. macilenta*, *C. duplicitinea*, *C. arenosa*, and *C. abnormata*) are confined to southern Africa. The range of *C. interrupta* extends to Zimbabwe and that of the remaining species to east Africa or further.

– **Species of lowveld and highveld:** species which, in addition to the range occupied by the pure lowveld taxa, occur on the highveld of the Transvaal and Zimbabwe, but do not penetrate the Kalahari Basin. It is not clear if their distribution is limited by absence of their food plants, the increased aridity of habitat or another, unrelated ecological factor. Because of the absence of barriers limiting dispersal, this group contains only a single endemic (*Chiasmia vau*).

– **Species of the Kalahari Basin.** The term Kalahari is used here purely in the geographical sense employed by Rutherford & Westfall (1986), and is not intended to denote a particular type of savanna, although much of the area consists of subdesert steppe with scattered trees. This subbiome includes parts of Matabeleland (Zimbabwe), the northern Transvaal, the

north-eastern Cape, Botswana, and western parts of Namibia. Two species (*Chiasmia ngani* from the northern Kalahari and *Platypepla jordani* from the area adjoining the Northern Cape) appear to be endemic.

**– Species confined to savanna of central and northern Namibia.** This small group of species is confined largely to savanna of varying aridity in a belt between approximately 19° and 24°S. These species may have had a wider range during moister climate regimes in the past (see below). This region stands out because of its high proportion of endemic Macariini, indicating a long separation from other faunas. Two of the five species (*Platypepla loranthiphaga* and *Chiasmia zobrysi*) are only known from this area. *Chiasmia inaequilinea*, the fifth species, is distributed widely in the arid southwest.

**– Species with continuous distribution from Namibia to the Transvaal and south-western Zimbabwe:** species which inhabit the savanna of Namibia, the entire Kalahari Basin and the highveld savanna of the (western) Transvaal and western Zimbabwe. Their distribution therefore cuts across several subbiome boundaries. This distribution pattern corresponds well to the Trans-Botswana transitional belt *sensu* Endrödy-Younga (1978). A dispersal from the east through this corridor in periods of higher humidity may explain the distribution of the species today confined to north and central Namibia (above).

**– Savanna species with centre of distribution in Zimbabwe:** this category includes 17 species that have a fairly wide distribution in Zimbabwe, but do not extend far to the north and south. This particular type of distribution is not explained easily, as there are no obvious barriers preventing southward dispersal into South Africa and Botswana, and only the Limpopo valley to prevent dispersal to the north. The six species of the *semitecta*-group are Afromontane, occurring at medium altitudes around 1500 m, and surrounding lowlands probably prevent their dispersal. Most of the other species are associated with savanna or open woodland, and their respective ranges may be limited by that of their food plant, but this is speculative. The correlation of the ranges of *Chiasmia kilimanjarensis* and its food plant, *Brachystegia*, has been discussed above.

To this arrangement, two further categories were added to include non-savanna **Generalists** or species of wide distribution which do not appear to favour a particular biome, and **Foreign Elements**, i.e., species which reach the limit of their range within southern Africa, frequently in the escarpment area of Zimbabwe. In their main area of distribution further north these species are associated with several different biomes.

This habitat classification system was superimposed on distribution maps of southern African Macariini, generated by collating all available label data of specimens, determining the quarter-degree references and entering these on standard distribution maps (Figs 96–

1038). A taxon may be listed more than once in Table 2 if it is not confined to a single category. In cases where a species is clearly less common in a given habitat, the entry is placed in round brackets. Also given is the species-group to which a given taxon belongs (where applicable); the numbers of species-groups are the same as those used in the systematic section (see Checklist, p. 000; Mi 1–7 = *Milocera*, 11–6 = *Isturgia*, C 1–23 = *Chiasmia*; A = *Acanthovalva*, C = *Chelotephrina*, P = *Platypepla*). The page number given refers to the text entry for the species or species-group in the descriptive section.

#### Phylogenetic aspects

Many species-groups within *Isturgia* and *Chiasmia* exhibit preferences for one or several of the biomes listed. The broad habitat preferences of species-groups are briefly summarized in Table 3 (species-groups in phylogenetic sequence as indicated in Figs 22 and 23).

It appears, therefore, that less derived species-groups, in particular in *Chiasmia*, tend to be associated with afromontane habitats or various types of forest, whereas phylogenetically younger (derived) groups are mostly inhabitants of savanna or open woodland. The likely historical processes that led to these distribution patterns, as well as to the worldwide distribution of Macariini will be discussed below.

#### Present macrodistribution of tribe Macariini

Most members of the *Platypepla* group of genera are confined to the Afrotropical region. Exceptions include *Acanthovalva* gen. n., the range of which includes, apart from the afrotropics, wide parts of the Palaearctic and probably the Nearctic region, and the Holarctic genus *Narraga* Walker (with its junior synonym *Fernaldella*), which is represented with one species (*nelvae* Rothschild) in Palaearctic northern Africa.

Macariini are poorly represented in Australia (Nielsen *et al.*, 1996), the known fauna consisting of 15 species in seven genera, one of which is undescribed. The six species of *Godonela* listed may be referable to *Chiasmia* as defined in the present study. *Discalma normata* (Walker) (*Tephrina*), originally described in 1861 from Moreton Bay, is widely distributed in the Old World tropics, including most of Africa and Madagascar. In the present study this species is included in *Chiasmia*. It is not clear if it reached Australia through human action.

In the Oriental region and the Indo-Australian tropics Macariini number around 100 named species, most of them in the genera *Hypephyra* Butler, *Oxymacaria* Warren, *Chiasmia* Hübner and *Godonela* Boisduval (Holloway, [1994]). However, only one species occurs on both sides of the lines of Wallace and Weber, which suggests that powers of dispersal of Macariini are not strong (Holloway, [1994]).

About 60 species occur in the Palaearctic region, most of which are confined to the eastern part. The main

genera represented are *Chiasmia* Hübner (usually cited as *Macaria*, *Godonela* or *Semiothisa*) and *Isturgia* Hübner in the revised and broader sense of Scoble & Krüger, *in prep.*

In the Nearctic region the entire macariine fauna consists of 253 species (Ferguson, 1983), the most species-rich genus being *Macaria*. The Canadian fauna numbers 68 species (McGuffin, 1972). *Narraga* Walker appears to be the only Nearctic representative of the *Platypepla* group of genera, although '*Semiothisa*' *eremiata* is probably referable to *Acanthovalva* (see above). The monotypic genus *Elpiste* Gumpenberg is interesting because the male genitalia exhibit a cingulate gnathos and small uncus horns; this combination of the plesiomorphic condition of the gnathos and the apomorphic condition of the uncus is also present in the Afrotropical *Chiasmia puerilis*.

The generic composition and relationships of the Neotropical macariine fauna are incompletely known. About 70 species have been described in *Semiothisa*, but perhaps only about 20 of these are correctly placed (Scoble, pers. comm.). For example, '*Semiothisa*' *bipartita* (Herbulot, 1988) from French Guiana is much closer to *Macaria*, although characterized by an acutely pointed sacculus in the male genitalia. After a cursory examination it seems certain that the Neotropical species of '*Tephrina*' have been incorrectly placed there. The *Platypepla* group of genera and less advanced Macariini appear to be absent. In Costa Rica the ranges of *Macaria* and *Semiothisa* overlap (Hua & Scoble, *in prep.*), the latter genus reaching its northern limit of distribution in Jamaica, Mexico and Cuba, while *Macaria* extends to Argentine and Paraguay (Hua & Scoble, *in prep.*). The phenotypic similarity of a number of species is such that dissection of the genitalia is required to establish generic identity.

#### *Evolutionary history of Macariini*

The distribution of recent Macariini points towards an origin of the group that occurred after Gondwanaland began to break up. This hypothesis is supported by the following observations:

(i) Very few species of Macariini occur in Australia. By the early late Cretaceous (94 Ma), the breakup of Gondwanaland was well under way, although Australia was still connected to Antarctica (Wing & Suess, 1992). There is no reason to assume that Macariini did occur in Australia but became extinct later, as the tribe is very adaptable to climatic change and its main food plant in the Afrotropical region, *Acacia*, is represented by some 500 species.

(ii) The *Platypepla* group of genera and primitive Macariini are absent from South America, which, by the same time, was no longer in contact with Africa. In the Neotropics, Macariini of the genera *Macaria* and *Semiothisa* are most prolific from Mesoamerica to Brazil, suggesting extensive speciation in the forest biome

following the arrival of ancestral species from the Nearctic.

The high diversity of the *Platypepla* group of genera and of the primitive new genus *Cheloteplrina*, as well as primitive species groups of *Chiasmia* in Africa is indicative of an Afrotropical origin of the tribe. It is of course also possible that Macariini evolved elsewhere and reached Africa subsequently, but the almost complete move of the entire *Platypepla* group to another zoogeographical region would be difficult to explain. In addition, there is some evidence for an origin of the 'horned' Macariini in the Afrotropical region. The most primitive recent taxa of Macariini, including *Chiasmia* species-groups 1–3, are confined to north-east Africa, from Somalia to Kenya, with the most primitive species occupying the northernmost range. Provided that no spatial displacement of ranges occurred in the past, it can be speculated that horned Macariini originated somewhere near the Horn of Africa. According to Besse & Courtillot (1988), Madagascar, which was still connected to India, by 85 Ma had moved sufficiently away from Africa to make faunal exchanges minimal, so that the minimum age of Macariini can be put tentatively at 80–90 Ma.

The relative positions of Africa, Madagascar and India at and shortly after the breakup of Gondwanaland are still disputed. Besse & Courtillot's (1988) study, based on geophysical and palaeomagnetic data, shows Madagascar and India connected to the Horn of Africa, while older studies (e.g., Tarling, 1972) favour a more southern position opposite Natal and Moçambique. Strong similarities between the macarine faunas of Madagascar and East Africa support the latter view. The composition of the macarine fauna of Madagascar and its relationship to that of mainland Africa are discussed below.

The faunal composition of Macariini in India differs strongly from that of Madagascar, but shows a number of affinities with that of the African mainland. In particular, species of the (phylogenetically young) *Isturgia disputaria*-group are very closely related. This would support a view that Madagascar and India split at an early stage of macariine evolution and that the original stock of Macariini in India later became extinct. The modern Indian macariine fauna probably arrived from the Afrotropics via Arabia. The date of collision of the Indian plate with Eurasia is usually put at around 50 Ma; however, new biostratigraphic evidence from western Pakistan puts the date at around 56 Ma (Beck *et al.*, 1995). During the Miocene, all areas along this dispersal route were covered with open woodland resembling today's savanna, so that ample opportunity existed for Macariini to diversify and extend their ranges (Potts & Behrensmeyer, 1992). The extant macarine fauna of Arabia is impoverished, following desertification during the Pliocene and Pleistocene, but contains several endemic taxa that are probably Miocene relics (*Isturgia*

*philbyi*, *Chiasmia frontosa*, *C. procidata fumida*, *C. buettikeri*.

It is difficult to obtain precise dates for the separation of North America from Europe. By the middle Eocene (50 Ma), North America was well separated from Europe, although the continental shelf was still in relatively close contact (Wing & Suess, 1992). The ancestors of modern Nearctic Macariini (notably species of *Macaria*, *Elpista* and *Isturgia*) therefore must have reached North America before that time, probably via Europe. *Semiothisa* most probably shares a common ancestor with *Macaria* (see cladogram, Fig. 21) and is here supposed to have evolved during the southward range extension of the American lineage of Macariini. South America was thus reached at a fairly late stage, possibly only after the isthmus of Panama connected the two continents in the Quaternary.

#### Late cenozoic ecosystems in Africa with reference to Macariini

By the mid-Cretaceous (115 Ma), some 35 million years after Gondwanaland began to split up, the contours of southern Africa probably did not differ much from their present form (Norton & Selater, 1979). Although the evolutionary history of Macariini probably reaches back to the Mesozoic, data about the development of terrestrial ecosystems in Africa during this period are scanty (Wing & Suess, 1992), and it seemed more appropriate to discuss the historical biogeography of Macariini in Africa against the more complete history of cenozoic ecosystems. Unless stated otherwise, the ecological information detailed below is taken from the review by Potts & Behrensmeyer (1992).

The first half of the Cenozoic (65–34 Ma) is regarded as a tectonically stable period in Africa. The absence of eastern highlands, the presence of a northern seaway and the greater warmth of the Atlantic than during the late Cenozoic resulted in large amounts of monsoonal moisture penetrating far into the continent. As a result, most of Africa was probably covered in lowland tropical to temperate rain forest (Axelrod & Raven, 1978), although more arid areas, covered with sclerophyll woodland and dry scrub have been inferred for south-central and south-western Africa. One may speculate that Macariini associated with forests today (e.g., *Milocera*, *Isturgia sakalava*-group, *Chiasmia* species-groups 6–10, 12–13) first appeared during this period. Nothing can presently be inferred about the original habitat preferences of the primitive *Chiasmia* species-groups 1–5. Many of these are confined today to the Somali-Arid zone and the Ethiopian highlands.

During the early to middle Miocene, tectonic activity increased and uplift, volcanism and rifting began to transform topography and rainfall patterns. Although some authors (Andrews & Van Couvering, 1975) assume the existence of a continuous band of broad-leaved rain forest from west to east Africa, floristic data indi-

cate the presence of savanna woodland, dry-adapted woodland or gallery forest species in a seasonal rainfall regime (Axelrod & Raven, 1978; Bonnefille, 1984, 1985). By 20–18 Ma rainforest was presumably discontinuous across Africa.

Relatively few Afrotropical Macariini show an afromontane pattern of distribution. Those that do so include the genus *Chelotephrina* (2 species) and three species-groups of *Chiasmia* (*semitecta* (16 species), *infabricata* (3 species) and *contaminata* (3 species)). Some species of *Milocera* also appear to be afromontane, but too little is presently known about their distribution. These species are likely to have developed in the wake of the tectonic activity during the early to middle Miocene. Today, many exhibit a disjunct distribution which is characterized by a more or less continuous range along the escarpment in east Africa and small, isolated relic populations in west Africa, e.g. on Mount Cameroon (4°12'N 9°11'E). As many inhabit forest, a possible explanation may lie in repeated habitat fragmentation during Quaternary glaciations (see below).

Although workers disagree about date and duration of contact between Africa and Eurasia prior to the Miocene (Potts & Behrensmeyer, 1992), it is accepted generally that definite contact was established 20 Ma ago, and northward drift of the continent continued for some 9 Ma into the middle Miocene. However, the presence of closely related *Chiasmia* species in Eurasia and North America strongly suggests that faunal exchange between Eurasia and Africa must have been possible considerably earlier than the Miocene.

Changed climatic conditions with stronger seasonality during the Miocene would have selected for drought-resistant taxa. The majority of modern Macariini associated with savanna, scrub or semidesert conditions (in particular *Isturgia* species-groups 2 and 4–6; *Chiasmia* species-groups 1–4, 15–23) probably began to evolve during this period. By contrast, species adapted to forest that was continuously distributed from west to east Africa during the early Cenozoic experienced a range contraction. This is illustrated by the east African populations of species of the *Chiasmia aestimaria*-group in rain forests in Kenya and Uganda, which today are isolated from the species' continuous west African distribution. It appears, however, that there was not a straightforward replacement of rain forest by open savanna-woodland in East Africa during this time, but rather the development of a mosaic of open and closed vegetation types. This increase in the diversity of available habitats may well have accelerated speciation in Macariini.

Similar processes led to the presence of savanna-woodland on the southern African highveld 10–16 Ma ago during the mid-Miocene, while tropical lowland forest was present along the east coast at the same time (van Zinderen Bakker & Mercer, 1986). This

is very recent compared with the age of similar forests further north, and these forests may be considerably older. Those Macariini confined to tropical and subtropical lowland forests in southern Africa today are likely to have followed a southward expansion of the biome, either along the east coast or further inland in periods when forests were more extensive than they are today.

The late Miocene and Pliocene were characterized by further aridification, resulting in continued disappearance of closed forests and woodlands with the expansion of savannas and grasslands in southern Africa (Van Zinderen Bakker & Mercer, 1986).

During the late Pliocene and Quaternary, desert conditions in the Sahara area were apparently well established 2.5 Ma ago. It seems likely that final separation between the respective macariine faunas of the Palearctic and Afrotropical regions only dates to the Quaternary, although there is evidence for the existence of desert areas in North Africa before this time.

The disjunct distribution of some Macariini, e.g., the *Chiasmia tecnum-* and *infabricata*-groups, may be attributable to repeated glaciation events during the Quaternary, during which rainforest was replaced by savanna. Such changes are thought to be responsible for the impoverished flora of African rain forests compared with those of South America, Malaysia and Madagascar (Axelrod & Raven, 1978). This notion is supported by the distribution of the species of the *Chiasmia trirecurva*-group, which are most diverse in those rainforests of parts of west Africa and Madagascar that were relatively undisturbed refugia during this period. Conversely, the savanna species of the *C. brongusaria*- and *olindaria*-groups possess several endemic representatives in the west African savanna from Nigeria to Senegal, which have become separated from the groups' east and southern African range by the Congo basin.

## Conclusions

Foodplant distribution emerges as the single most important ecological factor limiting macariine distribution in the Afrotropical region. Macariini as a group exhibit a wide temperature tolerance. Temperature, together with precipitation, probably exerts a more indirect influence on macariine distribution by determining food plant ranges. However, unlike several of their food plants, different macariine lineages, mostly species-groups, may be adapted to a particular biome, and frost directly appears to limit the distribution of many species in southern Africa.

The paucity of Macariini in Australia and the absence of the *Platypepla* group and primitive Macariini from South America, contrasted with the high diversity of the same groups in the Afrotropical region is interpreted as evidence for a post-Gondwanan origin of the tribe on

the African continent. Based on the presence on Madagascar of a rich and diverse macariine fauna lacking modern savanna elements, and geological dates for a split of Madagascar from the African mainland, a hypothetical minimum age for the tribe of 80–90 Ma is proposed.

It is further suggested that two major radiations of Macariini in Africa took place prior to and/or during the Cenozoic. The first such event is hypothesized to have occurred in the then dominant forest biome during the tectonically stable early Cenozoic (65–34 Ma). Geological and resulting climatic changes during the second half of the Cenozoic that led to increasing aridity and the replacement of much of the closed forest with a mosaic of forest, savanna-woodland and grassland initiated a second radiation, leading to the phylogenetically 'modern' species associated with savanna today.

## Vicariant speciation: Madagascar as a case study in isolation

Madagascar exhibits a high level of animal and plant endemism, due largely to its long history of isolation from the African mainland. For the past 150 million years Madagascar has remained at approximately the same latitude. Besse & Courtillot (1988) date the appearance of the first fracture lines at 141 Ma., and most authors agree on a date of separation of Madagascar and India from Africa at or before 100 Ma. The Moçambique channel had formed by 80 Ma, and the Indian subcontinent is estimated to have separated from Madagascar 80–90 Ma ago (Brown & Gibson, 1983).

It is likely that an exchange between Madagascar and Africa was still possible during the initial period of separation, e.g. at times of low sea levels, but by 85 Ma Madagascar, which was still connected to India, had moved sufficiently away from Africa to make faunal exchanges very unlikely (Besse & Courtillot, 1988). The low dispersal capabilities of most macariines have already been mentioned; in the Indo-Australian tropics, only one species has been able to cross the lines of Wallace and Weber (Holloway, [1994]), and the minimum age of Macariini can thus tentatively be put at 80–90 Ma.

### *Character of the Madagascan macariine fauna*

A list of Madagascan Heterocera is provided by Viette (1990). Of the 32 species of Macariini (including *Malgassothisa*) recorded so far, 26 (81.25%) are endemics that are presumed to have evolved in Madagascar; 4 (12.5%) are represented by endemic subspecies (*Chiasmia separata conjugata*, *C. umbrata juvenilis*, *C. simplicilinea pagenstecheri* and *C. strenuata arata*). These subspecies may have the same origin as the endemic species and not yet have given rise to new species, or conceivably they might have arrived later. In support of the last assumption one should note the wide distribution of the nominate subspecies on the main-

land, which in the case of *Chiasmia s. strenuata* extends from the Cape to Yemen. The remaining two species (*Isturgia deerraria* and *Chiasmia normata*) are generalists that occur throughout the greater part of the Afrotropical region and whose range extends into the Palaearctic and Oriental region, respectively.

*Platypepla* group of genera. This is poorly represented, with a single endemic species each of *Sphyrocosta*, *Acanthovalva* and *Milocera*. In the cladogram in Fig. 21 below, the *Platypepla* group of genera consists of two subclades (the first comprising *Acanthovalva*, *Sphyrocosta* and *Narraga*, the second *Plateopia*, *Platypepla* and *Milocera*), so the patchy representation on Madagascar is difficult to account for. In particular, it is not clear why *Milocera* did not speciate in the rainforests of the island, as the genus has done so successfully in west and central Africa.

Other Macariini. As on the African mainland, other Macariini are far more species-rich than the *Platypepla* group of genera, and *Isturgia* and *Chiasmia* are well represented, but show very considerable differences in species-group representation. *Isturgia* has eight Madagascan species. Four of these belong to the *supergressa*-group, which is represented by only two species on the African mainland (and a further seven Palaearctic species). This group is comparatively primitive (Fig. 22), and it is likely that its members were able to fill the savanna/open woodland niche occupied in Africa by more advanced groups: the dominant mainland savanna forms of the *disputaria*-group are represented by only two species, and the *presbitaria*-group is totally absent.

There are 15 Madagascan species of *Chiasmia*, although only 8 out of a total of 23 species-groups have been recorded. The *trirecurva*-group has speciated extensively, especially in the rainforests of the east, accounting for 6 species. Parallel to the development in *Isturgia*, the derived species-groups 9–23, which tend to be associated with the savanna biome, are absent. For reasons presently not understood, the *senitecta*- and *amarata*-groups, both of which are very successful on the mainland, have only a single representative each, although the habitat these groups prefer is widespread on Madagascar.

The *aestimaria*-group is represented by five Madagascan endemics. Two of these (*C. tsaratana* (Vierre) and *C. hypactinia* (Prout)) are Afromontane elements restricted to high elevations in the central and northern parts of the island, a distribution type not reported from the African mainland.

The single representative of the *rectistriaria*-group, *Chiasmia avitusariooides*, inhabits rainforest and is therefore probably phylogenetically old (see above).

'*Semiothisa*' *peyrierasi* is known only from the female holotype and its position in *Chiasmia* remains doubtful. The species has no known taxonomic affinities in the Afrotropical and Oriental regions.

The only species currently placed in *Malgassothisa*, *trifida* Herbulot, is probably a highly derived development within Macariini (see Phylogeny); its taxonomic affinities remain unclear.

An overview of the Madagascan macariine fauna, its residential status and species-group affinities is given in Table 4.

The Madagascan macariine fauna shows many similarities with that of south-eastern Africa. This is borne out by the existence of numerous pairs of sister taxa; sometimes pairs can only be separated by close examination of the genitalia, for example as with the numerous species of the *Chiasmia trirecurva*-group. In several other cases, the morphological differences have become more marked or the affinities of a species are obscure, as in the case of '*Semiothisa*' *peyrierasi*. A list of sister-species pairs is given in Table 5.

## PHYLOGENY

### Monophyly and position of Macariini within the Ennominae

The monophyly of Macariini is supported by a combination of two characters, (i) deeply cleft valvae in the male genitalia and (ii) transversely elongated chaetosemata (Forbes, 1948; Holloway, [1994]).

Due to the large number of species and homoplasious occurrence of many characters, ennomine classification is poorly resolved, making it difficult to determine the position of Macariini within the subfamily. Further problems are caused by convergence in wing pattern in non-macariine genera such as *Mesothisa* Warren, *Oxyfidonia* Warren or *Dasymacaria* Warren.

McGuffin (1976) embraced Forbes' (1948) subdivision of Ennominae, which was based on pupal characters, into a 'boarmiid' group, in which the cremaster is bifid, and an 'ennomid' group, in which it bears eight setae (in four pairs). In the Nearctic fauna, this 'boarmiid' group comprises, apart from Macariini, the Abraxini, Bistonini, Boarmiini and Melanolophiini. In a subsequent paper McGuffin (1987) presented a 'phylogenetic chart', placing Macariini (as Semiothisini) at the bottom of his system as the sister taxon of Abraxini. McGuffin's approach largely repeated the intuitive findings of earlier classifications, at least as far as the position of Macariini is concerned, possibly because of the lack of formal cladistic analysis and restriction to the Canadian fauna. The sister group of Macariini is likely to be one of the three following tribes:

Abraxini show similarities in genitalic structure, notably the occurrence of cleft valvae (see illustrations of the male genitalia of *Heliomata cycladata* Grote & Robinson (Fig. 192) and *Protitame matilda* Dyar)

(Fig. 193) in McGuffin (1972)), although the adult facies, notably of species of *Abraxas* Leach, is radically different from that of Macariini.

Eutoeini (Holloway, [1994]) contains genera in which the male genitalia have a deeply cleft valva, although of somewhat different structure to that of Macariini; species of *Luxiaria* Moore resemble externally adults of *Iridoplecta* Warren (excluded from Macariini by Scoble & Krüger, in prep.).

The affinities of the large Old World genus *Zamarada* Moore (Cassymini) are discussed in some detail by Fletcher (1974), but no mention was made of Macariini. The male genitalia of *Zamarada* species also show a separation of the valve into costa and sacculus, with the costa typically being very narrow and strongly curved and the sacculus somewhat triangular. The two species of the *keraia*-group (*Z. keraia* Fletcher and *Z. ekphysis* Fletcher), however, approach certain species of *Chiasmia* and *Isturgia* rather closely in male genitalia structure. As Fletcher placed the *keraia*-group at the beginning of his revision, he probably considered it to be generalized for the genus. The female genitalia of *Zamarada* species are characterized by a complex and heavily sclerotized sterigma in most species. An antrum is generally present, and the general structure approaches that of many Macariini outside the *Platypepla* group fairly closely. I have examined the chaetosemata of a number of southern African species and found that they approach the transversely elongated condition typical of Macariini; nevertheless they have been coded as separate in the cladistic analysis below. The wing pattern in *Zamarada* species is conspicuously modified, but shares many elements with the macariine pattern. On morphological grounds, it seems possible that *Zamarada* and Macariini share a common ancestor. Also, the majority of *Zamarada* species are legume feeders, as are primitive Macariini.

## Cladistic analyses

Three analyses were performed. The first served to examine relationships between the Afrotropical genera of the tribe, the predominantly Holarctic genera *Macaria* and *Narraga*, which are represented in Palaearctic North Africa, and the exclusively Neotropical genus *Semiothisa*. The second and third analyses were designed to elucidate the phylogeny in the Afrotropical region of the two largest genera, *Isturgia* and *Chiasmia*, using a species-group based approach.

The data matrices were analyzed using Hennig 86, version 1.5 (Farris, 1988), using the 'm\*'; bb\*'; xs w' command. Polarization of characters was carried out manually, and all characters were treated as additive. For the first and third analyses, where more than one tree was generated, the 'xsteps m' command was used to derive best and worst character fits. Independent analyses of the data matrices using PAUP version 1.5

(Swofford, 1985) resulted in similar numbers of trees with only minor differences in topography. Therefore, no further analyses using this version of PAUP were undertaken.

### Analysis 1: Macariine genera

The data matrix is based on 16 taxa and 13 characters (Tables 6, 7). The following taxa (by region) were included. Afrotropical Region (7): *Acanthovalva inconspicuaria*, *Chelotephrina acorema*, *Malgassothisa trifida*, *Milocera horaria*, *Plateoplia acrobelia*, *Platypepla spurcata*, *Sphyrocosta madecassa*. Palaearctic Region (6): *Boarmioides colpias*, *Chiasmia clathrata*, *Macaria liturata*, *Isturgia limbaria*, *Itame vincularia*, *Tephrena murinaria*. Nearctic Region (1): *Narraga partitaria*. Neotropical Region (1): *Semiothisa gambaria*. Outgroup: *Zamarada transvisata* (Cassymini).

The analysis yielded six trees, rooted at the outgroup, of length 81, a consistency index (ci) of 46 and a retention index (ri) of 63. The trees all share a similar topography. All place *Malgassothisa* at a basal trichotomy, reflecting its uncertain taxonomic position. Furthermore, all trees recover the following clades: (*Acanthovalva* + (*Narraga* + *Sphyrocosta*)); (*Macaria* + (*Chiasmia* + *Semiothisa*)); and (*Plateoplia* + (*Platypepla* + *Milocera*)).

Trees 1, 2, 4 and 5 were rejected because of incompatibility of their topography with biogeographical and morphological evidence: tree 1 places *Chelotephrina* between *Isturgia* and *Macaria*; tree 2 shows the closely related *Tephrena* and *Itame* separated by the clade (*Macaria* + (*Chiasmia* + *Semiothisa*)), and trees 4 and 5 both indicate an unlikely sister-group relationship between *Boarmioides* + *Platypepla* group and (*Macaria* + (*Chiasmia* + *Semiothisa*))). The remaining tree 3 is illustrated in Fig. 21; details of character changes are given in Table 8.

The new genus *Chelotephrina*, which is of uncertain taxonomic position, is placed at the bottom of the cladogram, however; it is by no means certain that *Chelotephrina* represents the sister-taxon of the other macarid genera included in the analysis.

The remainder of the tree contains two main clades; their topography is largely consistent with biogeographical and morphological evidence. The first clade comprises *Isturgia*, *Macaria*, *Chiasmia* and *Semiothisa*, with *Isturgia* as the sister taxon of (*Macaria* + (*Chiasmia* + *Semiothisa*))). This would suggest a derivation of the genera with uncus 'horns' from unhorned ancestors near *Isturgia*, and a subsequent loss of these horns in the Neotropical genus *Semiothisa*.

*Tephrena*, *Itame* and *Boarmioides*, the three genera placed near the base of the second clade, are morphologically closely related to *Isturgia*. The six genera of the *Platypepla*-group probably form a monophyletic group, although it cannot presently be decided whether

they share common ancestry with *Boarmioides* or with related genera as suggested in the cladogram.

#### *Isturgia* species-groups

The data matrix is based on 11 taxa and 16 characters (Tables 9, 10). The following taxa were included: *Isturgia catalauaria* (*catalauaria* group), *I. dukuduku* (*sakalava* group), *I. supergressa* (*supergressa* group), *I. deerraria* (*deerraria* group), *I. presbitaria* (*presbitaria* group); further included were the type species of *Tephrina*, *murinaria* ([D. & S.]) and *Enconista*, *miniosaria* (Duponchel) and three Afrotropical species not referable to any species group (*I. devecta*, *I. perplexa*, *I. geminata*). Outgroup: *Plateopia acrobelia* (*Platypepla* group of genera).

The analysis of this data matrix yielded a single tree (Fig. 22), rooted at the outgroup, with length 68, a consistency index of 0.69 and a retention index of 0.70; details of character changes are given in Table 11. The cladogram is fully resolved with the exception of a basal trichotomy at the root. The close similarity of the Palaearctic type species of *Tephrina*, *murinaria* D. & S., to the *Isturgia catalauaria*-group and of the type species of *Enconista*, *miniosaria* Lederer, to the species near *supergressa* Prout, is reflected in the tree. In the systematic part, *Enconista* is therefore treated as a junior subjective synonym of *Isturgia*.

Two of the three species of uncertain group affinity, *devecta* (Herbulot) and *perplexa* spec. n. are placed between the *supergressa*- and the *disputaria*-groups; *I. geminata*, as the least derived taxon, appears at the basis of the tree. The sequence of species-groups shown in the cladogram was adopted in the systematic account.

#### *Chiasmia* species-groups

The data matrix is based on 24 taxa and 23 characters (Tables 12, 13). The following taxa were included: *Chiasmia calvifrons* (*puerilis* group), *C. trinotata* (*trinotata* group), *C. diarnuodia* (*diarnuodia* group), *C. tecnum* (*tecnum* group), *C. semitecta* (*semitecta* group), *C. confuscata* (*trirecurva* group), *C. infabricata* (*infabricata* group), *C. amarata* (*amarata* group), *C. stenopis* (*aestimaria* group), *C. rectistriaria* (*rectistriaria* group), *C. simplicilinea* (*simplicilinea* group), *C. contaminata* (*contaminata* group), *C. unbrata* (*crassilembaria* group), *C. abinuata*, *C. brongusaria* (*brongusaria* group), *C. suriens* (*olindaria* group), *C. furcata* (*furcata* group), *C. observata* (*observata* group), *C. kirbyi* (*kirbyi* group), *C. marmorata* (*marmorata* group), *C. procidata* (*procidata* group), *C. multistrigata* (*multistrigata* group) and *C. curvifascia* (*curvifascia* group). For the outgroup a hypothetical ancestor was chosen, for which all characters were coded as 0.

The analysis of the third data matrix yielded 30 equally parsimonious trees with length 172, a consistency index of 0.45, and a retention index of 0.68. One cladogram was selected for illustration (Fig. 23); details of character

changes are given in Table 14. The trees are rooted at the outgroup. All cladograms show a rather similar topography, with a basal trichotomy and an identical sequence of taxa up to the *rectistriaria*-group. Except for a second trichotomy at node 38 the cladograms are fully resolved. The least-derived members of the genus (species-groups 1–4, *featheri* to *nubilata*) are small, inconspicuous macariines mostly with rounded hind wings. Groups 5 (*semitecta*) to 13 (*rectistriaria*) comprise most of the species with 'tailed' hind wings.

The remaining nine groups include the most derived forms, all of which are characterized by rounded hind wings. The interrelationships of these 'modern' groups remain unresolved because of difficulties in character interpretation due to the great morphological similarity of these species, accounting for the large number of trees. However, the cladograms confirm the expected sister-group relationships between the *multistrigata*- and the *curvifascia*-group, the *procidata*- and the *furcata*-group, and the *brongusaria*- and the *olindaria*-group. With the exception of these unresolved groups, the sequence of species-groups indicated in the cladograms was followed in the systematic account.

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## CLASSIFICATION

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### Diagnosis and description of tribe Macariini Guenée, [1858]

Macaridae Guenée, [1858]: 61.

Fidoniidae Guenée, [1858]: 95.

Semiothisinae Warren, 1894: 438.

Fernaldellinae Hulst, 1896: 318.

**DIAGNOSIS.** Macariini are small to fairly large Ennominae of mostly slender build, with fore wing length ranging between 7 and 25 mm. The about 700 described species exhibit considerable variation in facies and genitalic morphology. The tribe can be defined, however, by a combination of two characters: (i) the possession of deeply cleft valvae in the male genitalia and (ii) the transversely elongated condition of the chaetosemata (Forbes, 1948; Holloway, 1994).

Wing patterns vary strongly between genera and may be simple as in species of *Isturgia* or primitive representatives of *Chiasmia* (e.g., Figs 87–182) or more complex, e.g., in *Cheloteprina* and more derived *Chiasmia* species (Figs 82–84; 272–496). The genera *Malgassothisa* Herbulot from Madagascar (Figs 498, 499) and *Lampadopteryx* Warren, *Hypephyra* Butler and *Iridoplecta* Warren from the Oriental region (Holloway, 1994) have highly derived wing patterns. Occasionally, the termen of the hindwing is extended at M3, producing a short 'tail'. Many, although not all genera have a well-developed fovea in the fore wing of the male. Further characters not present in all genera, but of diagnostic

value, include the occurrence of a pair of sclerotized 'horns' on the uncus (rarely, three (Fig. 613) or four (Fig. 719) 'horns' may be present) and of paired caudal processes or octavals on the sternum of segment A8.

**DESCRIPTION.** The following description is based on a wide range of species from the Afrotropical region, representing all genera and species-groups, where applicable. For the Nearctic (Canadian) fauna the information detailed by McGuffin (1972) was used. From the other zoogeographical regions, species representing the major genera were selected (see also cladistic analysis).

**Head.** Vestiture consisting of elongated, appressed scales covering vertex and scapus (Fig. 7); scales on vertex often paler in colour. Frons smooth-scaled, usually oblique or slightly convex but occasionally with cone- or horseshoe-shaped prominence (Fig. 8). Eyes large, naked. Antennae of male plumose, bipectinate, serrated or filiform; those of female filiform, rarely shortly bipectinate. Ocelli not visible but probably present. Chaetosemata transversely elongated, tapering towards centre of the head; rarely normal. Proboscis well developed, with unscaled base. Labial palpi three-segmented with small third segment, thickly scaled, porrect, ascending or slightly drooping and 1–2 times diameter of eyes in length. Maxillary palpi one-segmented, very small and completely hidden beneath scales.

**Thorax.** Mostly slender but occasionally robust; vestiture of thorax usually concolorous with wings and paler on underside. Prothorax small. Pronotum broad with well developed carina. Patagia mostly well developed; tegulae weak. Mesothorax strongly enlarged. Metathorax small, with central part of metapostnotum membranous. **Legs:** smooth-scaled and slender or very slender, with long tarsi. Epiphysis present on fore leg. Tibial spurs 0–2–4, inner spur usually longer than outer one. Hind tibia of male occasionally modified and grooved, the groove being lined with silky, appressed hairs, or bearing hair-pencil. **Wings:** typically broad but occasionally narrower. Costa of fore wing fairly straight to convex; apex of fore wing pointed, rounded or falcate and occasionally notched. Hind wing sometimes attenuated at M3; termen rounded or, more rarely, crenulated. Fore wing with 12 veins. Cell about half as long as wing, rarely longer. Sc usually anastomosing with R1 or R1+2 for some distance. Stalking of radials variable. M2 arising midway between M1 and M3. CuA1 from near end, CuA2 from beyond middle of cell. 1A+2A rarely fused for entire length, usually 2A free for a short distance near base. Fovea absent, incomplete or well developed and then bounded by sigmoid base of A1 and a recurved process of CuA. Hind wing with 8 veins. Rs approximated to, but not anastomosing with, Sc+R1. M2 absent; M1 and M3 parallel. CuA1 and CuA2 as in fore wing. 1A normal; 2A reduced or weak and not reaching beyond cell (Figs 10–18). Wings coupled by frenulo-retinacular mechanism.

**Abdomen.** Usually small relative to wing size. Abdomen of female shorter and usually not reaching beyond anal angle of hind wing. Vestiture in many species concolorous with wings and paler on underside. Upperside occasionally with dark maculation. Tip of abdomen in some *Milocera* species with hair pencils (e.g., Fig. 521). A transverse patch of scales (*Milocera*) or a setal comb (several other genera) may be present. Octavals frequently developed. Tympanal organs typically geometrid: cavi tympani medium-sized to large, not touching mesally; ansa mostly slender and frequently slightly swollen medially and apically; tympanic lacinia present or absent. Sterna A2 and A3 may fuse to form sclerotized plate.

**Male genitalia.** Uncus well developed and attenuated (Fig. 538), triangular (Fig. 507) or dome-shaped (Fig. 594). A pair (rarely three or four) of sclerotized 'horns' present in many species. Gnathos absent or present and then cingulate with prominent arms (Fig. 507) or deeply emarginate with delicate arms (Fig. 594). Valvae deeply emarginate and more or less completely separated into dorsal costa and ventral sacculus (Fig. 19); shape of valvae very variable. Juxta usually not prominent and crescent- or shield-shaped. Tegumen and vinculum mostly rounded and lacking special modifications, but x-shaped dorsal line frequently well developed. Base of vinculum occasionally with weak hair-pencils. Saccus broad and rounded (e.g., Fig. 738) or produced into tip of varying length in some species (e.g., Fig. 502). Aedeagus small to large and showing great variation in size and number of cornuti.

**Female genitalia.** Exhibiting considerable variation, particularly in the shape of the bursa copulatrix and structure of sterigma and antrum. Papillae anales short and rounded (e.g., Fig. 745) to elongated (e.g., Fig. 922), but without modifications. Apophyses very thin to fairly thick, rod-like and moderately long. Apophyses anteriores shorter, reaching on average two-thirds length of a. posteriores. Sterigma present and simple to highly complex in structure, or absent; if present, lamella antevaginalis and l. postvaginalis separate or fused. Operculum present or absent. Antrum usually present and frequently with two longitudinal, sclerotized bands. Bursa copulatrix short and stout (e.g., Fig. 747) to greatly elongated (e.g., Fig. 906). Ductus bursae usually ribbed, occasionally extending beyond antrum (Fig. 826). Corpus bursae mostly membranous but sometimes spinose. Bursa wall rarely tough and leathery (some species of *Isturgia supergressa*-group). Signum absent or present and then usually stellate.

## Genera included in the present study

### *Platypepla* group

In contrast to certain macaraine genera (see below), the generic boundaries within the *Platypepla* group are

distinct. The differences in male genitalia structure are so clear-cut (cf. Figs 500–544) that usually valve shape alone is sufficient to determine the generic affinities of a specimen. Four out of six genera recognized are monotypic or contain no more than three species.

### *Acanthovalva* gen. n.

The genus contains six species, three of which are described as new. In facies, adults resemble species of *Isturgia* but may be distinguished by the finely plumose antennae of the male. The main characters defining this genus are provided by the male genitalia (see Diagnosis, below). The close taxonomic relationship of *Acanthovalva* to the Holarctic genus *Narraga* Walker (with *Fernaldella* Hulst as junior subjective synonym) has been mentioned above. The sister-group relationship of *Acanthovalva* with (*Narraga* + *Sphyrocosta*) indicated in Fig. 21 is not followed in the systematic section, where *Sphyrocosta* is treated as the sister-group of *Plateoplia*, based on the presence of a hammer-headed costa in the male genitalia of both genera, as well as phenotypical similarity of the adults. Distribution of *Acanthovalva* extends into the Palaearctic and possibly the Nearctic, as ‘*Semiothisa*’ *eremiata* (Guenée) from eastern North America should probably be placed here (Covell, 1984, pl.50, Fig.9). However, it being an extralimital taxon no material was examined.

### *Narraga* Walker, 1861

*Narraga* Walker (junior synonym: *Fernaldella* Hulst) is a small genus showing a Holarctic distribution, and has a single representative (*Narraga nelvae* (Rothschild)) in the Palaearctic part of Africa. Male genitalia structure differs between the Eurasian and Nearctic representatives (Scoble & Krüger, *in prep.*); in *Narraga partitaria* (Grote) (as *Fernaldella*) in McGuffin (1972, Fig. 196) it suggests that *Narraga* is probably the sister-group of *Acanthovalva*, although the female genitalia differ in several aspects (e.g., presence of a well-developed antrum and of a small stellate signum in *Narraga*).

### *Plateoplia* Warren, 1909

*Plateoplia* is monotypic and contains the single species *acrobelia* (Wallengren) (though cited by Warren as *ochriciliata* Warren, a junior subjective synonym). The genus is defined by autapomorphies of the male antenna, which is serrated, the flattened serrations bearing whorls of cilia, and by the form of the valve in the male genitalia. *Plateoplia* is here considered to be the sister-group of *Sphyrocosta* gen. n., below.

### *Sphyrocosta* gen. n.

The monotypic genus contains the single species *madecassa* (Viette) (*Xenostega*) from Madagascar. Two

autapomorphies are provided by the male genitalia. *Sphyrocosta madecassa* is the only Afrotropical macariine with marked sexual dimorphism.

### *Milocera* Swinhoe, 1904

With 26 species, this is by far the most species-rich genus. It falls into two monophyletic subgenera, *Milocera* Swinhoe and *Meiocera* subgen. n., based on the absence or presence of large cornuti or striations on the vesica. Within these subgenera a number of monophyletic species-groups are recognizable. Based originally on the Madagascan species *horaria*, Swinhoe erroneously considered the genus to be closely related to *Psilocladia* Warren, although its correct position is within the *Platypepla* group of genera. Presently the most likely candidate for the sister-group of *Milocera* is *Platypepla* below, a genus of mostly southern African distribution.

### *Platypepla* Warren, 1900

The genus includes 13 species, 11 of which are described as new. Larvae, as far as is known, appear to feed exclusively on Loranthaceae. Although Warren referred to *Platypepla* as being structurally close to ‘*Semiothisa*’, a name he mostly used for the ‘tailed’ species of the *Chiasmia trirecurva*-group, its affinities are actually rather distant.

### Other Macariini

#### Genera lacking uncus ‘horns’

##### *Chelotephrina* gen. n.

*Chelotephrina* comprises two species, *C. crypsispila* (Fletcher), formerly placed in *Tephrina*, and *C. acorema* sp. n. from southern Africa. They are excluded from *Isturgia* because of differences in wing pattern and genitalia structure, which were already noted by Fletcher (1958b). The genus is based on two apomorphies from the male genitalia, namely the broad, trilobate uncus and the costa of the valve, which is modified into a claw-like structure (Figs 545, 546). In the female genitalia, the antrum lacks the vertical sclerotized bands. The taxonomic position of *Chelotephrina* remains partly unresolved, although the genus probably represents a basal member of the clade.

##### *Tephrina* Guenée, 1854

In its revised sense (Scoble & Krüger, *in prep.*), *Tephrina* is a small Palaearctic genus resembling *Isturgia* Hübner (below) in male genital morphology but lacking the characteristically ‘scooped’ medial element of the gnathos found in members of that genus. In the type species and relatives, the sacculus is pointed and the saccus generally extended prominently. Most of

the Afrotropical species placed in this genus in the past are transferred to *Isturgia* Hübner. The only representative in the study area is *Tephrina muriaria cineraria* (Duponchel), recorded from Morocco (Rungs, 1981).

### ***Isturgia* Hübner, [1823]**

In the past, variation in adult habitus and the fact that the taxonomic importance of genitalia structure had not yet been realized led to the description of about a dozen genera for those Macariini with a dome-shaped, setose uncus lacking horns, a typically cingulate gnathos and cleft valvae in which the costa does not bear a ventral process. Similar to the taxonomic situation of horned macariines, the characters on which most of these genera are based, are in fact not unique autapomorphies but independent derivations. Although a number of well-defined and obviously monophyletic species-groups or subgenera exist, it would have added to the existing taxonomic confusion to name these.

In the Afrotropical region, almost all taxa concerned had been placed in *Tephriina* Guenée prior to this revision. As in the case of *Chiasmia*, below, the type species of *Isturgia*, *limbata* (Fabricius), has bright yellow wings. In the study area, *Isturgia* is represented by 45 species that are assigned to five species-groups, leaving four species of uncertain group affinity. The sequence of species-groups in the descriptive section follows Fig. 22.

The female genitalia of some species of the *supergressa*-group are characterized by a greatly elongated antrum and a partly spinose bursa copulatrix. This condition is also observed in *Thysanopyga* Herrich-Schäffer (Krüger & Scoble, 1992), providing a striking example of parallel development. A number of species belonging to *Isturgia* were in the past misplaced in genera outside the Macariini such as *Aspitates* Treitschke (usually cited as *Aspilates*, an unjustified emendation), *Eubolia* Duponchel and *Fidonia* Treitschke (a junior objective synonym of *Eurranthis* Hübner).

### ***Boarmioides* Lucas, 1932**

*Boarmioides* is a monotypic genus restricted to Palaearctic North Africa. Adults of *B. colpias* are small, inconspicuous insects with a forewing pattern somewhat reminiscent of the genus *Boarmia* Treitschke. In male genitalia structure, *Boarmioides* is perhaps closest to the 'horned' genus *Macaria*, but distinguished, apart from the absence of 'horns', by the notched, rather than cleft margin of segment A8.

### ***Itame* Hübner, [1823]**

In its revised sense (Scoble & Krüger, *in prep.*), *Itame* contains only the type species, *vincularia* (Hübner), plus a second species from Morocco. Although several

closely related species exist, particularly in North Africa, these have been placed in *Isturgia* as they lack the valval processes that characterize this genus.

## **Genera with uncus 'horns'**

### **General comments**

Cladistic analysis suggests that these genera include the more derived Macariini and form a monophylum; however, the possibility exists that uncus 'horns' originated independently several times within the tribe from ancestors with a setose uncus. Taken as a whole, they are far more species-rich than the *Platypepla* group of genera and indeed other unhorned Macariini. In the study area, *Chiasmia* Hübner alone is represented by 170 species or 63.2% of the total macariine fauna of the study area.

### ***Macaria* Curtis, 1826**

*Macaria* is a large genus of predominantly Holarctic distribution. The only representative to occur in the study area is *M. wauaria africana* (Zerny, 1934), formerly placed in *Itame*. Structurally, *Macaria* is close to *Chiasmia* but lacks the subuncus sclerite in the male genitalia.

### ***Chiasmia* Hübner, [1823] 1816**

A very large genus, comprising species of diverse habitus, but characterized by a synapomorphy of the male genitalia, the presence of an elliptical, anteriorly cleft subuncus sclerite. The type species of *Chiasmia*, *clathrata* (Linnaeus) is distinguished by a striking reticulate wing pattern, but this is merely an adaptation to the diurnal habits of the adults, as was already noted by Prout in Seitz (1915). A similar situation exists regarding the type species of *Isturgia* (*conspicuata* [D. & S.]), which is a bright yellow, diurnal insect. Its genitalia exhibit no appreciable differences e.g. from many of the nocturnal species previously placed in *Tephriina* Guenée.

### **Comments on some genera synonymized with *Chiasmia* in the present study**

Species formerly placed in the genus *Osteodes* Guenée, [1858] (type species *procidata* Guenée from Ethiopia) are highly characteristic in facies, being straw-coloured with prominently developed terminal shades (Figs 409–420). *Osteodes* Guenée is a junior homonym of *Osteodes* Conrad, 1855 (Mollusca) (Fletcher, 1979). There is no objective replacement name. As the type species of *Osteodes* is congeneric with *Chiasmia*, not *Semiothisa*, as stated by Fletcher (1979), the constituent species are here included in a species-group of *Chiasmia*.

*Tephriopsis* Warren, 1896 (type species *parallelaria*

Walker, [1863]) and *Peridela* Warren, 1897 (type species *crassata* Warren, 1897) are synonymized with *Chiasmia*, as they are based on differences in the pectination of the antenna of the male, which is an unreliable character, at least in the Afrotropical fauna. Further generic names that fall into the range of variation of *Chiasmia* and are therefore treated as synonyms are *Allocroasis* Strand, 1912 (type species *suriens* Strand, 1912 from German East Africa (Tanzania) and *Discalma* Meyrick, 1891 (type species *parallelaria* Walker, [1863] from Australia, a junior subjective synonym of *normata* Walker, 1861).

### Relationship between *Chiasmia* and *Semiothisa*

This was resolved only recently by Inoue (1986), who pointed out the fundamental differences in genitalic structure between true *Semiothisa*, restricted to the neotropics, and the various Old World genera. That the confusion over the identity of these genera persisted for so long can be explained largely by difficulties in determining the publication dates of some of Hübner's works (Hemming, 1937), which led to conflicting interpretations of correct type species. When it was established that the type species of *Semiothisa* was *gambaria* Hübner, from Surinam, and not one of the Old World species, many authors had, albeit often reluctantly, already accepted *Semiothisa* as the name for their Old World species.

### *Malgassothisa* Herbulet, 1966

*M. trifida* Herbulet, the only species included, has normal chaetosemata, although the male possesses well-formed uncus horns and cleft, trilobate valvae. Since a secondary loss of the transversely elongated condition of the chaetosemata has taken place elsewhere in Macariini, it seems probable that *Malgassothisa* represents a very specialized line of development, comparable to *Lampadopteryx*, *Hypephyra* and *Iridoplecta* in the Oriental region. The genus is dealt with in the Appendix.

### Checklist of genera and species of the Macariini of Africa, Madagascar and Arabia

Type species are marked by an asterisk. Taxa not occurring in the study area appear in square brackets.

### TRIBUS MACARIINI Guenée, [1858]

#### A. The *Platypepla* group of genera

##### 1. Genus *ACANTHOVALVA* gen. n.

1. *inconspicnaria*\* (Hübner, [1819]) comb. n.  
(*Geometra*)

- = *pumicaria* (Lederer, 1855) (*Eubolia*)
- = *osyrraria* (Guenée, [1858]) (*Selidosema*)
- = *cinerascens* (Butler, 1875) (*Acidalia*)
- = *perturbata* (Bastelberger, 1908) syn. n.  
(*Tephrina*)
- = *cinnamomaria* (Rothschild, 1914) syn. n.  
(*Tephrina*)

##### 2. *magna* sp. n.

##### 3. *capensis* sp. n.

##### 4. *itremo* sp. n.

##### 5. *bilineata* (Warren, 1895) comb. n. (*Ematurga*)

= *antennata* (Warren, 1897) (*Tephrina*)

##### 6. *focularia* (Geyer, 1837) comb. n. (*Eurrantius* (*Catoprapta*))

#### 2. Genus *NARRAGA* Walker, 1861

= *Fernaldella* Hulst, 1896

##### 1. *nelvae nelvae* (Rothschild, 1912) (*Fidonia*)

#### 3. Genus *PLATEOPLIA* Warren, 1909

##### 1. *acrobelia*\* (Wallengren, 1875) (*Tephrina*)

= *flavata* (Warren, 1897) (*Pristostegania*)

= *ochriciliata* (Warren, 1901) syn. n.  
(*Tephrinopsis*)

#### 4. Genus *SPHYROCOSTA* gen. n.

##### 1. *madecassa*\* (Viette, 1973) comb. n. (*Xenostega*)

#### 5. Genus *MILOCERA* Swinhoe, 1904

Subgenus *Milocera* Swinhoe, 1904

##### 1. *horaria*-group:

###### 1. *horaria*\* Swinhoe, 1904 (*Milocera*)

##### 2. *eugompha*-group:

###### 2. *eugompha* sp. n.

###### 3. *podocarpi* Prout, 1932 (*Milocera*)

###### 4. *depauperata* sp. n.

##### 3. *pyrinia*-group:

###### 5. *sexcoruata* sp. n.

###### 6. *herbuloti* sp. n.

###### 7. *pyrinia* Prout, 1934 (*Milocera*)

##### 4. *diffusata*-group:

###### 8. *nstatoides* sp. n.

###### 9. *diffusata* (Warren, 1902) comb. n. (*Azata*)

##### 10. *zika* sp. n.

##### 11. *ja* sp. n.

##### 12. *scoblei* sp. n.

##### 13. *aurora* sp. n.

##### 5. *ustata*-group:

###### 14. *obfuscata* sp. n.

###### 15. *ustata* Herbulet, 1973 (*Milocera*)

###### 16. *umbrosa* Herbulet, 1989 (*Milocera*)

Subgenus *Meiocera* subgen. n.

**6. arcifera-group:**

17. *arcifera* (Hampson, 1910) (*Tephrina*)
18. *pelops* sp. n.
19. *divorsa* Prout, 1922 (*Milocera*)
20. *thyestes* sp. n.
21. *hypamycha* sp. n.

**7. dubia-group:**

22. *dubia* (Prout, 1917) **stat. n.** (*Discalma*)
23. *aureolitoralis* sp. n.
24. *atreus* sp. n.
25. *tantalus* sp. n.

**Species of uncertain group placement:**

26. *facula* Prout, 1934 (*Milocera*)

**6. Genus PLATYPEPLA Warren, 1900**

1. *spurcata*\* (Warren, 1897) (*Heterolocha*)
  - = *nudaria* Warren, 1900 (*Platypepla*)
  - = *deformis* (Warren, 1909) **syn. n.** (*Epigynopteryx*)
2. *jordani* sp. n.
3. *uhlenhuthi* sp. n.
4. *macilenta* sp. n.
5. *griseobrunnea* sp. n.
6. *loranthiphaga* sp. n.
7. *flava* sp. n.
8. *persubtilis* sp. n.
9. *bullifera* sp. n.
10. *pseudospurcata* sp. n.
11. *mackayi* sp. n.
12. *schistopenis* sp. n.
13. *curvigliadiata* sp. n.

**B. Other Macariini****1. Genus CHELOTEPHRINA gen. n.**

1. *crypsispila*\* (Fletcher, 1958) **comb. n.** (*Tephrina*)
2. *acorema* sp. n.

**2. Genus TEPHRINA Guenée, [1845] 1844**

1. *murinaria*\* *cineraria* (Duponchel, 1829) (*Fidonia*)

**3. Genus ISTURGIA Hübner, [1823] 1816**

- = *Bichroma* Gumpenberg, 1887
- = *Enconista* Lederer, 1853

**1. catalaunaria-group:**

1. *catalaunaria* (Guenée, [1858]) **comb. n.**
  - (*Psamatodes*)
  - = *dataria* (Walker, 1861) (*Tephrina*)
  - = *defectaria* (Walker, 1861) (*Tephrina*)
  - = *occupata* (Walker, 1862) (*Aspilates*)
  - = *proxantharia* (Walker, [1863]) (*Aspilates*)
  - = *cogitata* (Walker, [1863]) (*Panagra*)
  - = *largificaria* (Möschler, 1887) (*Semiothisa*)
2. *triseriata* (Prout, 1926) **comb. n.** (*Tephrina*)

3. *univirgaria* Mabille, 1880 **comb. n.** (*Tephrina*)

**2. sakalava-group:**

4. *dukuduku* sp. n.
  5. *sakalava* (Herbulot, 1954) **comb. n.** (*Tephrina*)
  3. *supergressa*-group:
- [6. *miniosaria miniosaria* (Duponchel, 1829) (*Sciodiona*)]
- a. *miniosaria duponcheli* (Prout in Seitz, 1915) **comb. n.** (*Enconista*), repl. name  
= *perspersaria* (Duponchel, [1830]) (*Fidonia*), nom. praeocc.

7. *hausmanni* sp. n.

8. *terminipuncta* sp. n.

9. *supergressa* (Prout, 1913) **comb. n.** (*Tephrina*)

10. *prionogyna* (Prout, 1916) **comb. n.** (*Tephrina*)

11. *exospilata* (Walker, 1861) **comb. n.** (*Panagra*)  
= *ansorgei* (Warren, 1898) (*Tephrina*)

12. *contexta* (Saalmüller, 1891) **comb. n.** (*Tephrina*)  
= *caeca* (Saalmüller, 1891) (*Tephrina*)

13. *modestaria* (Pagenstecher, 1907) **comb. n.** (*Macaria*)

14. *averyi* (Viette, 1980) **comb. n.** (*Tephrina*)

15. *comorensis* sp. n.

16. *berytaria* (Staudinger, 1892) **comb. n.** (*Halia*)

- [17. *spodiaria spodiaria* (Lefèvre, 1831) (*Fidonia*)  
= *semincanaria* (Freyer, 1832) (*Fidonia*)  
= *cerataria* (Guenée, [1858]) (*Selidosema*)

- a. *spodiaria mizanensis* Wehrli in Seitz, 1940

18. *exustaria* (Staudinger, 1897) **comb. n.** (*Selidosema*)

19. *rubrior* (Hausmann, 1990) **comb. n.** (*Enconista*)

**4. disputaria-group:**

20. *disputaria* (Guenée, [1858]) **comb. n.** (*Eubolia*)

- = *indotata* (Walker, [1863]) **syn. n.** (*Aspilates*)

- = *strenuata* (Walker, [1863]) **syn. n.** (*Macaria*)

- = *martiniaria* (Oberthür, 1876) **syn. n.** (*Fidonia*)

- = *lithina* (Butler, 1883) **syn. n.** (*Tephrina*)

- = *granitalis* (Butler, 1883) **syn. n.** (*Tephrina*)

- = *zebrina* (Butler, 1883) **syn. n.** (*Tephrina*)

- = *infictaria* (Swinhoe, 1885) **syn. n.** (*Macaria*)

- = *subocellata* (Warren, 1896) **syn. n.** (*Tephrina*)

- = *darmouini* (Dumont, 1932) (*Eubolia*), infrasubsp.

- = *hachia* (Dumont, 1932) (*Eubolia*), infrasubsp.

- = *nigrescente* (Lucas, 1948) (*Lithina*), infrasubsp.

21. *netta* (Holland, 1897) **comb. n.** (*Grammodes*)

22. *exerraria* (Prout, 1925) **comb. n.** (*Tephrina*)

23. *deerraria* (Walker, 1861) **comb. n.** (*Tephrina*)

- = *nemorivaga* (Wallengren, 1872) (*Tephrina*)

- = *dissocia* (Warren, 1897) (*Tephrina*)

24. *pygmaeata* sp. n.

25. *griveaudi* sp. n.

26. *perviaaria* (Lederer, 1855) **comb. n.** (*Eubolia*)

- = *albofascia* (Swinhoe, 1884) (*Fidonia*)

27. *sublimbata* (Butler, 1884) **comb. n.** (*Tephrina*)

28. *arizela* (Fletcher, 1978) **comb. n.** (*Tephrina*)

29. *quadriplaga* (Rothschild, 1921) **comb. n.** (*Tephrina*)

- = *pallidaria* (LeCerf, 1924) (*Tephrina*)  
 30. *inaeqnivirgaria* (Mabille, 1890) **comb. n.**  
 (= *Tephrina*)

**5. presbitaria-group:**

31. *philbyi* (Wiltshire, 1980) **comb. n.** (*Tephrina*)  
 32. *spissata* (Walker, 1862) **comb. n.** (*Aspilates*)  
 33. *arizeloides* sp. n.  
 34. *albogrisea* sp. n.  
 35. *megasaccus* sp. n.  
 36. *presbitaria* (Swinhoe, 1904) **comb. n.** (*Tephrina*)  
 37. *virescens* sp. n.  
 38. *kiellandi* sp. n.

**Species of uncertain placement (alphabetical):**

39. *devecta* (Herbulot, 1966) **comb. n.** (*Ectropis*)  
 40. *famula brunnea* (Le Cerf, 1923) **comb. n.**  
 (= *Bichroma*)  
 41. *geminata* (Warren, 1897) **comb. n.** (*Tephrina*)  
 (= *bilineata* (Warren, 1898)) (*Tephrina*)  
 42. *perplexa* sp. n.

**Species excluded from *Isturgia* ('*Tephrina*')**

'*Tephrina*' *camerunensis* Herbulot, 1973

**4. Genus ITAME Hübner, [1823] 1816**

- [1. *vincularia*\* Hübner, [1813] 1796 (*Geometra*)]  
 a. *vincularia latefasciata* Rothschild, 1914 (*Itame*)  
 b. *vincularia mrasinaria* Oberthür, 1923 (*Tephrina*)  
 (= *atlantis* Prout, 1928) (*Itame*)  
 c. *vincularia lycioidaria* Herbulot, 1957 (*Itame*)  
 2. *teknaria* Rungs & Powell, 1942 (*Itame*)

**5. Genus BOARMOIDES Lucas, 1932**

- = *Pseudoboarmia* Lucas, 1932  
 1. *colpias*\* (Prout, 1928) (*Diastictis*)  
 (= *desertaria* (Lucas, 1932)) (*Pseudoboarmia*)

**6. Genus MACARIA Curtis, 1826**

- = *Diastictis* Hübner, [1823], nec 1818  
 = *Speranza* Curtis, 1828  
 = *Grammatophora* Stephens, 1829, repl. name  
 = *Halia* Duponchel, 1829 nec Risso, 1826  
 = *Philobia* Duponchel, 1829  
 = *Eutropa* Hübner, [1831]  
 = *Eupisteria* Boisduval, 1840  
 = *Thamnonoma* Lederer, 1853, repl. name  
 = *Fidonia* Herrich-Schäffer, 1855, nec Treitschke,  
 1825  
 = *Psamotodes* Guenée, [1858]  
 = *Enfitchia* Packard, 1876  
 = *Catastictis* Gumpenberg, 1887, repl. name  
 = *Elpista* Gumpenberg, 1887  
 = *Physostegania* Warren, 1894  
 = *Dysmigia* Warren, 1895

- = *Sciagraphia* Hulst, 1896  
 = *Symphera* Hulst, 1896, nec Förster, 1868  
 = *Xenoecista* Warren, 1897  
 = *Gladela* Grossbeck, 1909, repl. name  
 = *Proutictis* Bryk, 1938, repl. name

1. *wanaria africana* (Zerny, 1934) **comb. n.** (*Itame*)  
 (= *carolata* (Lucas, 1938)) (*Larentia*)

**7. Genus CHIASMIA Hübner, [1823] 1816**

- = *Pharmacis* Hübner, [1823], nec [1816]  
 = *Arte* Stephens, 1829, repl. name  
 = *Hercyna* Stephens, 1829, nec Treitschke, 1828  
 = *Strenia* Duponchel, 1829  
 = *Godonela* Boisduval, 1840, repl. name  
 = *Acadra* Herrich-Schäffer, [1854]  
 = *Osteodes* Guenée, [1858], nec Conrad, 1855  
 = *Evarzia* Walker, 1860  
 = *Gnbaria* Moore, [1887]  
 = *Discalma* Meyrick, 1891  
 = *Automolodes* Warren, 1894  
 = *Tephrinopsis* Warren, 1896  
 = *Xenoneura* Warren, 1896, nec Scudder, 1867  
 = *Hyostomodes* Warren, 1897  
 = *Peridela* Warren, 1897  
 = *Inlocera* Warren, 1905  
 = *Allochrosis* Strand, 1912  
 = *Thyridesia* Wehrli, 1940

**1. featheri-group:**

1. *calvifrons* (Prout, 1916) **comb. n.** (*Discalma*)  
 2. *pnerilis* (Prout, 1916) **comb. n.** (*Discalma*)  
 3. *featheri* (Prout, 1922) **comb. n.** (*Hyostomodes*)  
 4. *zelota* (Prout, 1922) **comb. n.** (*Hyostomodes*)  
 5. *ate* (Prout, 1926) **comb. n.** (*Hyostomodes*)  
 6. *dodoma* sp. n.

**2. tecnum-group:**

7. *tecnum* (Prout, 1916) **comb. n.** (*Macaria*)  
 (= *ignava* (Prout, 1928) syn. et **comb. n.**  
 (*Hyostomodes*))  
 8. *monopepla* (Prout, 1934) **comb. n.** (*Hyostomodes*)  
 9. *frontosa* (Wiltshire, 1980) **comb. n.** (*Hyostomodes*)  
 10. *banian* (Vitté, 1981) **comb. n.** (*Semiothisa*)

**3. trinotata-group:**

11. *trinotata* (Warren, 1902) **comb. n.** (*Tephrinopsis*)  
 12. *trinotatula* sp. n.

**4. nubilata-group:**

13. *diarmodia* (Prout, 1925) **comb. n.** (*Tephrina*?)  
 14. *ngami* sp. n.  
 15. *nubilata* (Warren, 1897) **comb. n.** (*Hyostomodes*)  
 16. *extrnsilinea* (Prout, 1925) **comb. n.** (*Hyostomodes*)  
 17. *somalica* sp. n.

**5. semitecta-group:**

18. *semitecta* (Walker, 1861) **comb. n.** (*Panagra*)  
 (= *gnophosata* (Walker, [1863])) (*Macaria*)

19. *brunnescens* sp. n.
20. *grisescens* (Prout, 1916) **comb. n.** (*Discalma*)  
= *dolichostigma* (Prout, 1922) (*Macaria*)
21. *murina* sp. n.
22. *hunyani* sp. n.
23. *melsetter* sp. n.
24. *bomfordi* sp. n.
25. *pinleyi* sp. n.
26. *deleta* sp. n.
27. *alternata* (Warren, 1899) **comb. n.** (*Gonodela*)
28. *orthostates* (Prout, 1915) **comb. n.** (*Macaria*)
29. *iringa* sp. n.
30. *johnstoni* (Butler, 1893) **comb. n.** (*Tephritis*)
31. *semicolor* (Warren, 1899) **comb. n.** (*Tephritisopsis*)
32. *rhabdophora* (Holland, 1892) **comb. n.**  
(*Gonodela*)  
= *interlineata* (Warren, 1904) **syn. n.** (*Gonodela*)
33. *nobilitata* (Prout, 1913) **comb. n.** (*Macaria*)
- 6. infabricata-group:**
34. *infabricata* (Prout, 1934) **comb. n.** (*Semiothisa*)
35. *adelpha* sp. n.
36. *nevilledukei* sp. n.
- 7. tirecurva-group:**
37. *tirecurva* (Saalmüller, 1891) **comb. n.**  
(*Macaria*)
38. *confuscata* (Warren, 1899) **comb. n.** (*Semiothisa*)  
= *hypoleuca* (Prout, 1916) **syn. et comb. n.**  
(*Macaria*)
39. *sororcula* (Warren, 1897) **comb. n.** (*Azata*)  
= *unicolor* (Warren, 1905) **syn. n.** (*Gonodela*)
40. *fuscataria* (Möschler, 1887) **comb. n.** (*Semiothisa*)  
= *commixta* (Warren, 1897) (*Gonodela*)
41. *malgassofusca* sp. n.
42. *flavicuneata* (Herbulot, 1987) **comb. n.**  
(*Semiothisa*)
43. *separata separata* (Warren, 1899) **comb. n.** (*Azata*)  
= *rectilinea* (Warren, 1905) (*Gonodela*)
- 43a. *separata conjugata* (Herbulot, 1966) **comb. n.**  
(*Semiothisa*)
44. *livorosa* (Herbulot, 1964) **comb. n.** (*Semiothisa*)
45. *neolivorosa* sp. n.
46. *parallacta* (Warren, 1897) **comb. n.** (*Semiothisa*)  
= *apicepallens* (Warren, 1905) (*Gonodela*)  
= *stramineata* (Bastelberger, 1909) **syn. n.**  
(*Semiothisa*?)
47. *paucimacula* sp. n.
48. *phaeostigma* (Fletcher, 1958) **comb. n.**  
(*Semiothisa*)
49. *natalensis* (Warren, 1904) **comb. n.** (*Semiothisa*)
50. *coronoleucas* (Prout, 1915) **stat. et comb. n.**  
(*Macaria*)
51. *fontainei* (Fletcher, 1963) **comb. n.** (*Semiothisa*)
52. *threnopis* (Fletcher, 1963) **comb. n.** (*Semiothisa*)
53. *crumenata* (Fletcher, 1963) **comb. n.** (*Semiothisa*)
54. *conturbata* (Warren, 1898) **comb. n.** (*Gonodela*)  
= *punctiversa* (Warren, 1905) (*Gonodela*)
55. *inquinata* sp. n.
56. *insulicola* sp. n.
57. *feraliata* (Guenée, [1858]) **comb. n.** (*Macaria*)  
= *elata* (Prout, 1916) **syn. n.** (*Macaria*)
- 8. amarata-group:**
58. *amarata amarata* (Guenée, [1858]) **comb. n.**  
(*Macaria*)  
= *lataria* (Walker, 1861) (*Macaria*)  
= *leighi* (Warren, 1904) (*Gonodela*)  
?= *cataleucaria* (Mabille, 1897) (*Macaria*)
- 58a. *amarata choica* (Prout, 1932) **comb. n.**  
(*Semiothisa*)
59. *acutiapex* sp. n.
60. *evansi* sp. n.
61. *kilifi* sp. n.
62. *simplex* sp. n.
63. *cararia* (Swinhoe, 1904) **comb. n.** (*Semiothisa*)
64. *deceptrix* sp. n.
65. *duplicilinea* (Warren, 1897) **comb. n.** (*Gonodela*)
66. *megalesia* (Viette, 1975) **comb. n.** (*Semiothisa*)
67. *unigeminata* (Prout, 1923) **comb. n.** (*Macaria*)
68. *costiguttata* (Warren, 1899) **comb. n.** (*Azata*)  
= *tripлага* (Warren, 1899) **syn. n.** (*Azata*)  
= *deuteria* (Prout, 1932) **syn. n.** (*Semiothisa*)
69. *kenyae* sp. n.
70. *orientalis* sp. n.
71. *trigonolensa* (Herbulot, 1987) **comb. n.**  
(*Semiothisa*)
72. *plutocrypsis* (Herbulot, 1987) **comb. n.**  
(*Semiothisa*)
73. *angolae* (Bethune-Baker, 1913) **comb. n.**  
(*Macaria*)
74. *subcretata* (Warren, 1905) **comb. n.** (*Gonodela*)
75. *geminalinea* (Prout, 1932) **comb. n.** (*Semiothisa*)
76. *abyssinica* sp. n.
77. *subvaria* (Bastelberger, 1907) **comb. n.** (*Gonodela*)  
= *cretiguttata* (Bastelberger, 1909) **syn. n.**  
(*Gonodela*)
- 9. aestimaria-group:**
78. *aestimaria* (Hübner, [1809]) **comb. n.** (*Geometra*)  
= *contemptata* (Guenée, [1858]) (*Macaria*)  
= *tunesiella* (Lucas, 1949) (*Macaria*)
79. *sareptanaria* (Staudinger, 1871) **comb. et stat. n.**  
(*Macaria*)
80. *syriacaria* (Staudinger, 1871) **comb. n.** (*Macaria*)
81. *tenuiata* (Staudinger, 1871) **comb. et stat. n.**  
(*Macaria*)
82. *streniata streniata* (Guenée, [1858]) **comb. n.**  
(*Macaria*)  
= *anuandata* (Walker, 1861) (*Macaria*)  
= *lunivallata* (Warren, 1905) (*Godonella*)
- 82a. *streniata arata* (Saalmüller, 1891) **comb. n.**  
(*Macaria*)  
= *albogrisearia* (Mabille, 1900) (*Macaria*)  
= *flavipicta* (Bastelberger, 1907) (*Gonodela*)
83. *herbuloti* (Viette, 1973) **comb. n.** (*Semiothisa*)

84. *hypactinia* (Prout, 1916) **comb. n.** (*Macaria*)  
     = *bupalaria* (Herbulot, 1954) **syn. n.**  
     (*Semiothisa*)
85. *tsaratanana* (Viette, 1980) **comb. n.** (*Semiothisa*)
86. *tetragraphicata* (Saalmüller, 1880) **comb. n.**  
     (*Hemerophila*)  
     = *balteata* (Saalmüller, 1891) (*Macaria*)
87. *angolaria* (Snellen, 1872) **comb. n.** (*Macaria*)
88. *parastreniata* sp. n.
89. *buettikeri* (Wiltshire, 1980) **comb. n.** (*Semiothisa*)
90. *collaxata* (Herbulot, 1987) **comb. n.** (*Semiothisa*)
91. *ostentosaria* (Möschler, 1887) **comb. n.**  
     (*Semiothisa*)  
     = *siennata* (Warren, 1900) (*Gonodela*)
92. *impar* (Warren, 1897) **comb. n.** (*Gonodela*)  
     = *laguatia* (Prout, 1917) (*Macaria*)
93. *grandis* sp. n.
94. *percroptera* (Prout, 1915) **comb. n.** (*Macaria*)
95. *albivia* (Prout, 1915) **comb. n.** (*Macaria*)
96. *fitzgeraldi* (Carcasson, 1964) **comb. n.**  
     (*Semiothisa*)

**10. crassilembaria-group:**

97. *crassilembaria* (Mabille, 1880) **comb. n.**  
     (*Macaria*)
98. *peremarginata* sp. n.
99. *umbrata unibrata* (Warren, 1897) **comb. n.**  
     (*Gubaria*)  
     = *sherrata* (Swinhoe, 1904) (*Semiothisa*)
- 99a. *umbrata juvenilis* (Herbulot, 1964) **comb. n.**  
     (*Semiothisa*)
100. *maronga* sp. n.
101. *aureobrunnea* sp. n.
102. *inouei inouei* (Herbulot, 1987) **comb. n.**  
     (*Semiothisa*)
- 102a. *inouei ponentis* (Herbulot, 1987) **comb. n.**  
     (*Semiothisa*)

**11. contaminata-group:**

103. *contaminata* (Warren, 1902) **comb. n.** (*Gubaria*)
104. *lindemannae* (Fletcher, 1958) **comb. n.**  
     (*Semiothisa*)
105. *curvilineata* (Warren, 1899) **comb. n.** (*Semiothisa*)

**12. simplicilinea-group:**

106. *austera* (Prout, 1932) **comb. n.** (*Semiothisa*)
107. *simplicilinea simplicilinea* (Warren, 1905) **comb. n.** (*Acadra*)
- 107a. *simplicilinea pagenstecheri* (Herbulot, 1978)  
     **comb. n.** (*Semiothisa*), repl. name  
     = *trigonata* (Pagenstecher, 1907) (*Macaria*), nom.  
     praeocc.
108. *affinis* (Warren, 1902) **comb. n.** (*Acadra*)
109. *fulvisparsa* (Warren, 1897) **comb. n.** (*Acadra*)
110. *fulvimargo* (Warren, 1899) **comb. n.** (*Semiothisa*)
111. *kilimanjarensis* (Holland, 1892) **comb. n.**  
     (*Tephrina*)  
     = *zombina* (Butler, 1893) (*Gonodela*)

- = *mundipennis* (Warren, 1901) (*Gonodela*)  
     = *transvisata* (Warren, 1904) (*Gonodela*)

**13. rectistriaria-group:**

112. *rectistriaria* (Herrich-Schäffer, 1854) **comb. n.**  
     (*Acadra*)  
     = *monstraria* (Walker, 1861) **syn. n.** (*Macaria*)  
     = *postvittata* (Walker, [1863]) **syn. n.** (*Macaria*)
113. *majestica majestica* (Warren, 1901) **comb. n.**  
     (*Semiothisa*)
- 113a. *majestica tropica* (Prout, 1915) **comb. n.**  
     (*Macaria*)
114. *avitusarioides* (Herbulot, 1956) **comb. n.**  
     (*Semiothisa*)

**14. multistrigata-group:**

115. *multistrigata multistrigata* (Warren, 1897) **comb. n.** (*Gonodela*)
- 115a. *multistrigata liliput* **subsp. n.**
116. *improcera* (Herbulot, 1987) **comb. n.**  
     (*Semiothisa*)
117. *zobrysi* sp. n.

**15. curvifascia-group:**

118. *curvifascia* (Warren, 1897) **comb. n.** (*Peridela*)  
     = *pallidizona* (Hampson, 1910) **syn. n.** (*Boarmia*)
119. *boarmioides* sp. n.
120. *unifilata* (Warren, 1899) **comb. n.** (*Gonodela*)

**16. procidata-group:**

121. *turbulentata* (Guenée, [1858]) **comb. n.**  
     (*Osteodes*)  
     = *exumbrata* (Walker, [1863]) **syn. n.** (*Aspilates*)  
     = *eritreensis* (Prout, 1915) **comb. n.** (*Osteodes*)
122. *procidata procidata* (Guenée, [1858]) **comb. n.**  
     (*Osteodes*)
- 122a. *procidata semispurcata* (Walker, [1863]) **comb. n.** (*Aspilates*)
- 122b. *procidata fumida* (Wiltshire, 1980) **comb. n.**  
     (*Semiothisa*)
123. *latimarginaria* (Rebel, 1907) **comb. n.** (*Osteodes*)
124. *warreni* (Prout, 1915) **comb. n.** (*Osteodes*), repl.  
     name  
     = *exumbrata* (Warren, 1902) (*Osteodes*), nec  
     Walker, [1863]
125. *pervittata* (Hampson, 1909) **comb. n.** (*Osteodes*)

**17. furcata-group:**

126. *furcata* (Warren, 1897) **comb. n.** (*Tephrina*)
127. *inaequilinea inaequilinea* (Warren, 1911) **comb. n.** (*Peridela*)  
     = *birecta* (Prout, 1917) (*Peridela*)
- 127a. *inaequilinea eremias* (Prout, 1935) **comb. n.**  
     (*Tephrina* (*Peridela*))
128. *butaria* (Swinhoe, 1904) **comb. n.** (*Semiothisa*)
129. *grimmia* (Wallengren, 1872) **comb. n.** (*Macaria*)  
     = *illineata* (Warren, 1901) (*Tephrinopsis*)

**18. observata-group:**

130. *observata* (Walker, 1861) **comb. n.** (*Tephrina*)  
 131. *subcurvaria subcurvaria* (Mabille, 1897) **comb. n.** (*Discalma*)  
 131a. *subcurvaria araps* (Prout, 1926) **comb. n.** (*Discalma*)

#### 19. *kirbyi*-group:

132. *kirbyi* (Wallengren, 1875) **comb. n.** (*Macaria*)  
 = *distinguenda* (Warren, 1897) (*Gonodela*)  
 133. *vau* (Prout, 1913) **comb. n.** (*Macaria*)  
 134. *morogoro* sp. n.  
 135. *crassata* (Warren, 1897) **comb. n.** (*Peridela*)  
 = *benguellae* (Prout, 1928) **syn. n.** (*Tephrina*)  
 136. *semiolivacea* sp. n.  
 137. *punctilinea* (Prout, 1917) **comb. n.** (*Peridela*)  
 138. *dentilineata* (Warren, 1899) **comb. n.** (*Tephrina*)  
 139. *costicommata* (Prout, 1922) **comb. n.** (*Macaria*)

#### 20. *brongusaria*-group:

140. *brongusaria brongusaria* (Walker, 1860) **comb. n.** (*Epione?*)  
 = *?exsecutaria* (Walker, 1861) (*Tephrina*)  
 = *miliaria* (Felder & Rogenhofer, 1874) (*Phasiane*)  
 = *oleochroa* (Hampson, 1909) (*Tephrina*)  
 = *incessaria* (Walker, 1861) (*Tephrina*)  
 = *sabulifera* (Warren, 1899) (*Tephrinopsis*)  
 = *uvidaria* (Swinhoe, 1904) **syn. n.** (*Semiothisa*)  
 140a. *brongusaria exosciodes* (Prout, 1925) **comb. n.** (*Semiothisa*)  
 141. *imitatrix* sp. n.  
 142. *sudanata* (Warren & Rothschild, 1905) **comb. n.** (*Peridela*)  
 143. *senegambiensis* sp. n.  
 144. *tristis* sp. n.  
 145. *castanea* sp. n.  
 146. *inconspicua inconspicua* (Warren, 1897) **comb. n.** (*Tephrina*)  
 146a. *inconspicua pertesa* (Prout, 1932) **comb. n.** (*Tephrina*)  
 147. *androphoba* sp. n.  
 148. *assimilis* (Warren, 1899) **comb. n.** (*Tephrinopsis*)  
 = *instructaria* (Swinhoe, 1904) (*Semiothisa*)  
 149. *maculosa* (Warren, 1899) **comb. n.** (*Gonodela*)  
 = *tattaria* (Swinhoe, 1904) (*Semiothisa*)  
 150. *ammodes* (Prout, 1922) **stat. et comb. n.** (*Macaria*)

#### 21. *olindaria*-group:

151. *olindaria* (Swinhoe, 1904) **comb. n.** (*Tephrina*)  
 152. *suriens* (Strand, 1912) **comb. n.** (*Allochrosis*)  
 153. *danmariae* sp. n.  
 154. *sanguresara* sp. n.  
 155. *soror* sp. n.  
 156. *trizonaria* (Hampson, 1909) **comb. n.** (*Macaria*)  
 = *conventa* (Prout, 1913) **syn. n.** (*Macaria*)  
 157. *clathrata*\* *azrouensis* (Wehrli, 1937) **comb. n.** (*Semiothisa* (*Chiasmia*))

158. *umbratilis* (Butler, 1875) **comb. n.** (*Gnophos*)  
 = *arhoparia* (Swinhoe, 1904) (*Semiothisa*)  
 = *berengaria* (Fawcett, 1916) (*Peridela*)  
 = *novaria* (Fawcett, 1916) (*Peridela*)  
 = *butaria* ab. *spilota* (Warren, 1905) (*Peridela*)  
 [infrasubspecific name]

#### 22. *marmorata*-group:

159. *marmorata* (Warren, 1897) **comb. n.** (*Tephrinopsis*)  
 = *pallida* (Warren, 1897) (*Tephrinopsis*)  
 [infrasubspecific name]  
 160. *semialbida* (Prout, 1915) **comb. n.** (*Macaria*)  
 161. *obliquilineata* (Warren, 1899) **comb. n.** (*Gonodela*)  
 162. *interrupta* (Warren, 1897) **comb. n.** (*Peridela*)

#### Species of uncertain group placement (alphabetical):

163. *abnormata* (Prout, 1917) **comb. n.** (*Tephrina*)  
 164. *anguifera* (Prout, 1934) **comb. n.** (*Semiothisa*)  
 165. *arenosa* (Butler, 1875) **comb. n.** (*Aspilates*)  
 = *sordidata* (Warren, 1897) (*Rhodia?*)  
 = *bitaeniata* (Warren, 1914) (*Tephrinopsis*)  
 166. *getula* (Wallengren, 1872) **comb. n.** (*Macaria*)  
 = *fuscorufa* (Prout, 1915) **syn. n.** (*Macaria*)  
 167. *gyliura* (Prout, 1932) **comb. n.** (*Semiothisa*)  
 168. *nana* (Warren, 1898) **comb. n.** (*Evarzia*)  
 = *atriclathrata* (Hampson, 1909) (*Macaria*)  
 169. *normata* (Walker, 1861) **comb. n.** (*Tephrina*)  
 = *congener* (Warren, 1897) (*Tephrinopsis*)  
 = *desiccata* (Walker, 1866) (*Tephrina*)  
 = *exfusaria* (Walker, ([1863]) (*Aspilates?*)  
 = *malefidaria* (Mabille, 1880) (*Epione*)  
 = *minoia* (Strand, 1915) (*Tephrina*)  
 = *parallelaria* (Walker, ([1863]) (*Aspilates*)

#### Species excluded from *Chiasmia* ('*Semiothisa*'):

- '*Semiothisa*' *cricophera* Prout MS (= *Xylopteryx dargei* Herbulot, 1984)  
 '*Semiothisa*' *peyrierasi* Viette, 1975

#### Species auctorum (alphabetical):

- Psamatodes arenularia* Mabille, 1880  
*Macaria destitutaria* Walker, 1861  
*Fidonia deviaria* Walker, [1863]  
*Tephrina inaequata* Walker, 1861  
*Macaria infixaria* Walker, [1863]  
*Tephrina latascriptata* Walker, [1863]  
*Tephrina malesignaria* Mabille, 1880  
*Macaria testaceata* Walker, [1863]

#### APPENDIX

8. Genus *MALGASSOTHISA* Herbulot, 1966  
 1. *trifida*\* Herbulot, 1966

## Key to the genera of Macariini of Africa, Madagascar, and Arabia

- 1 ♂ genitalia: valve with costa and sacculus completely or nearly completely separated (Figs 500–544). ♀ genitalia (Figs 745–770) with bursa wall partly or entirely spinose, or, if membranous, lacking well-developed stellate signum; antrum absent. Small to rarely medium-sized, frequently ochreous moths (fw length 8–17 mm) (Figs 24–81) [Platypepla group of genera] ..... 2
- ♂ genitalia with costa and sacculus incompletely separated (Figs 545–744). ♀ genitalia with bursa wall membranous and mostly with stellate signum (Figs 771–780, 788–968), or, if spinose, with large, elongate antrum (Figs 781–787). Small to medium-sized moths (fw length 7–19 mm) of very diverse habitus (Figs 82–499) [other Macariini] ..... 7
- 2(1) Small, ochreous moths, typically with narrow wings; occasionally suffused with brown (Figs 34–36, 65–81). ♂ genitalia as in Figs 507, 508, 533–544; ♀ genitalia as in Figs 751, 752, 765–770 ..... 3
- Small to medium-sized, light to dark grey or brown moths; if somewhat ochreous then with falcate fore wings (Figs 24–33, 37–64). ♂ genitalia as in Figs 500–506, 509–531; ♀ genitalia as in Figs 745–750, 753–764 ..... 5
- 3(2) Small, ochreous moths with relatively narrow forewings (Figs 65–81). ♂ genitalia somewhat variable, mostly as in Figs 534–542, with long, slender costa and broad sacculus and a short sclerotized arm arising from base of costa; occasionally with subtriangular costa, very elongated sacculus and long saccus (Fig. 533), with a strongly sclerotized, sword-like process arising from base of saccus (Fig. 543) or with a massive, apically rounded ventral process arising from base of costa (Fig. 544). ♀ genitalia, where known, with very small, rounded bursa with spinose wall (Figs 765–770). Mostly southern Africa but extending to Ethiopia and Nigeria ..... *Platypepla* Warren, p. 61
- Larger moths with broader wings (Fig. 34) or similar to the above (Figs 35, 36). ♂ genitalia (Figs 507, 508) with hammer-headed costa and less prominent sacculus and saccus. ♀ genitalia (Figs 751, 752) with membranous bursa copulatrix and complex sterigma. Widely distributed throughout the study area ..... 4
- 4(3) ♂ genitalia (Fig. 507) with short ventral process on costa; sacculus terminating in long digitate process. ♀ genitalia (Fig. 751) with rather large bursa, bearing a small sclerotized tooth. Southern Africa (monotypic) ..... *Plateoplia* Warren, p. 40
- ♂ genitalia (Fig. 508) without ventral process on costa; sacculus narrowly triangular. ♀ genitalia (Fig. 752) with much smaller bursa, entirely membranous. Madagascar (monotypic) ..... *Sphyrocosta* gen. n., p. 41
- 5(2) Small to medium-sized moths, frequently with falcate fore wings (Figs 37–64). ♂ genitalia somewhat variable in shape (Figs 509–531), frequently with groups of spines on costa. ♀ genitalia (Figs 753–764) with spinose bursa copulatrix. Madagascar (one species), African mainland from Zimbabwe northwards (26 species) ..... *Milocera* Swinhoe, p. 42
- Small moths with evenly rounded, non-falcate fore wings (Figs 24–33). ♂ genitalia as in Figs 500–506; costa setose (*Narraga*) or bearing spines (*Acanthovalva*). ♀ genitalia (Figs 745–750) with spinose or membranous bursa copulatrix. *Acanthovalva* widely distributed in study area, one species reaching the Palaearctic; *Narraga* confined to North Africa ..... 6
- 6(5) ♂ genitalia (Figs 500–505) with costa and sacculus not very widely separated; costa with groups of small to well-developed spines. ♀ genitalia, where known, with bursa copulatrix spinose (Fig. 745–749) ..... *Acanthovalva* gen. n., p. 33
- ♂ genitalia (Fig. 506) with costa and sacculus widely separated; costa setose. ♀ genitalia (Fig. 750) with bursa wall membranous, bearing a small signum ..... *Narraga* Walker, p. 39
- 7(1) ♂ genitalia with ventral part of uncus naked or evenly setose (Figs 545–586). ♀ genitalia as in Figs 771–815. Mostly greyish or brownish moth with rounded hind wings (Figs 82–165) ..... 8
- ♂ genitalia with ventral part of uncus bearing two enlarged midventral setae or a pair or, rarely, three or four conspicuous 'horns' (Figs 587–743). ♀ genitalia as in Figs 816–968. Various coloured moths, often with 'tailed' hind wings (Figs 166–499) ..... 12
- 8(7) ♂ genitalia with uncus trilobate (Figs 545, 546); gnathos cingulate, narrow; costa of valve curved or recurved, claw-like. Antrum of ♀ as in Fig. 771, lacking vertical bands; bursa copulatrix membranous. Adults as in Figs 82–84. Two species, southern and eastern to western Africa ..... *Chelotephrina* gen. n., p. 71
- ♂ genitalia (Figs 547–586) with triangular or dome-shaped uncus; gnathos angular (e.g., Fig. 576) or cingulate (e.g., Fig. 561); costa not claw-like. ♀ genitalia with membranous (Figs 772–780, 788–815) or, rarely, leathery and spinose bursa copulatrix (Figs 781–787); antrum with vertical bands. Widely distributed ..... 9
- 9(8) Small, delicate moths with bark-like forewing pattern (Figs 164, 165). ♂ genitalia as in Fig. 586, ♀ genitalia as in Fig. 815. Palaearctic North Africa (one species) ..... *Boarnioides* Lucas, p. 116
- Mostly larger, more robust moths; forewing

- pattern variable but not bark-like (Figs 85–162). ♂ and ♀ genitalia as Figs 547–585 and 772–814, not as above. Widely distributed, including several species in Palaearctic North Africa ..... 10
- 10(9) ♂ genitalia having gnathos with prominently grooved medial element (Figs 548–584); sacculus simple, mostly rounded, rarely pointed. ♀ genitalia as in Figs 773–813. Widely distributed throughout Africa (43 species) ..... *Isturgia* Hübner, p. 74
- ♂ genitalia with medial element of gnathos not grooved (Figs 547, 585); sacculus pointed (Fig. 547) or blunt, with complex structure (Fig. 585). ♀ genitalia as in Figs 772, 814. Two largely Eurasian genera with a single representative each in Palaearctic North Africa ..... 11
- 11(10) ♂ genitalia with simple, pointed sacculus; gnathos with medial element not well developed (Fig. 547). ♀ genitalia as in Fig. 772. A single species in study area ..... *Tephrina* Guenée, p. 73
- ♂ genitalia with complex, blunted sacculus; gnathos with medial element well developed (Fig. 585 of *I. vincularia*, genitalia of *I. teknaria* not examined); ♀ genitalia as in Fig. 814. Two species in study area ..... *Itame* Hübner, p. 113
- 12(7) Moths bright orange (Figs 498, 499). ♂ genitalia with strikingly trilobate valvae (Fig. 744). ♀ genitalia lacking antrum (Fig. 968). Madagascar (monotypic) ..... *Malgassothisa* Herbolut, p. 272
- Moths variously coloured but not bright orange (Figs 166–497). ♂ genitalia with bilobate valvae (Figs 587–743). ♀ genitalia at least with a small antrum (Figs 816–966). Widely distributed, only one genus (*Chiasmia*) occurring on Madagascar ..... 13
- 13(12) ♂ genitalia (Fig. 587) lacking subuncus sclerite. ♀ genitalia as in Fig. 816. Widely distributed in northern hemisphere; only one species in study area, confined to Palaearctic North Africa (Fig. 166) ..... *Macaria* Curtis, p. 117
- ♂ genitalia (Figs 588–743) with elliptical subuncus sclerite. ♀ genitalia as in Figs 817–966. Numerous species in Afrotropical, Palaearctic and Oriental Regions, 169 species in study area ..... *Chiasmia* Hübner, p. 120

## A. The *Platypepla* group of genera

**DIAGNOSIS.** The *Platypepla* group of genera contains small Macariini of slender build; adults have a forewing length of 8–17 mm. The group is defined by the following likely apomorphies: (i) the complete or near-complete separation of costa and sacculus in the male genitalia and (ii) the partial or total covering of the bursa wall in denticles or spines (instrate condition) in the female genitalia (secondarily reduced in *Plateopia*). A rhombic cremaster bearing lateral filamentous proc-

esses (Fig. 6 a) is at present known only from one species of *Platypepla* but may prove to be a synapomorphy for the entire group.

Most species are either yellowish-ochre or dark grey or brown moths; an exception is provided by the partly diurnal, brightly coloured *Acanthovalva focularia* (Geyer). Wing markings are generally simple and often consist of a basic line pattern only (Figs 24–81). Species of *Acanthovalva* have fairly broad, rounded wings (Figs 24–31), while in *Milocera* Swinhoe and *Platypepla* Warren the fore wing is more or less strongly falcate (Figs 37–81). The other genera all exhibit rather narrow wings and a pointed fore wing apex.

**DESCRIPTION.** See also remarks under description of tribe.

**HEAD.** As described for Macariini, but scales on vertex usually not differing in colour. Antennae of male filiform (ciliate), plumose (*Acanthovalva*), shortly bipectinate or serrated with whorls of cilia (*Plateopia acrobelia*). Frons lacking protuberances.

**THORAX.** *Legs:* hind tibia of male not modified. *Wings:* broad to narrow (see above). Apex of fore wing rounded, pointed or falcate; termen of hind wing rounded or weakly crenulated and not attenuated at M3. Fovea present in *Acanthovalva*, *Plateopia* and *Platypepla*. Otherwise as described for tribe.

**ABDOMEN.** Small and slender relative to wing size. Tip of abdomen in *Milocera* with hair pencils (e.g., Fig. 528). Octavals mostly present, often consisting of a broad, sclerotized lip (e.g., Fig. 523). Setal comb on sternum A3 absent, but a transverse patch of scales found in *Milocera*. Tympanal organs with large, comparatively weakly sclerotized cavi tympani. Tympanic lacinia absent.

**Male genitalia.** Generally symmetrical except in some species of *Milocera*. Uncus prominent, attenuated or triangular (Figs 500–544); surface usually setose but bearing spines of varying size in *Acanthovalva* (Figs 500–505). Uncus 'horns' always absent. Gnathos present or absent. Valvae exhibiting complete separation of costa and sacculus; shape and armament characteristic for the different genera. Tegumen and vinculum more or less rounded but almost spherical in *Platypepla curvigliadiata* (Fig. 544). Saccus in most species prominent. Aedeagus very small (*Platypepla*) to large (*Milocera*); vesica with or without cornuti of varying size, or displaying striations.

**Female genitalia.** Papillae anales and apophyses as described for tribe. Sterigma present and mostly complex. Antrum present or absent, but if present of different structure than in other Macariini and lacking vertical bands. Operculum present in some species of *Milocera*. Bursa copulatrix small relative to size of abdomen (Figs 745–770). Ductus bursae variously shaped, but not ribbed and usually short and compact. Bursa wall spinose or, more rarely, membranous. Signum absent.

## 1. Genus *ACANTHOVALVA* gen. n.

Type species: *Geometra inconspicuaria* Hübner, [1819]: pl. 97, Fig. 500, by present designation.

GENERAL APPEARANCE (Figs 24–31). Small to medium-sized, grey to greyish-brown platypeplines with rounded wings; *A. focularia* more colourful, with orange, maculate hind wings. Wing pattern simple, consisting of basal, median, and postmedian line on fore wing, and of median and postmedian line on hind wing, but often more or less obsolete. Head: ♂ antennae plumose, leaving apical segments free; ♀ antennae ciliate or very finely serrated. Frons smooth. Labial palpi porrect or drooping, 1.5–2.0 times diameter of eyes. Proboscis well developed. Legs: very slender; metathoracic leg of ♂ not dilated or bearing hair-pencil.

VENATION (Fig. 10). Fore wing: R<sub>1</sub>+2 anastomosing with Sc for some distance, then briefly free and touching, or anastomosing with, R<sub>3</sub>+4; R<sub>3</sub>–5 stalked; 1A+2A fused throughout; fovea well developed (*A. inconspicuaria*, *A. magna*), small (*A. itremo*) or absent (*A. bilineata*, *A. capensis*). Hind wing: Sc+R<sub>1</sub> touching, but not anastomosing with, Rs; A<sub>2</sub> absent.

MALE GENITALIA (Figs 500–505). Uncus prominent and showing some variation in shape, but always armed with a varying number of strong spines; in *A. bilineata* uncus trilobate. Gnathos absent. Tegumen broad, squarish to rounded; vinculum produced into long saccus in *A. bilineata*, *capensis* and *itremo*. Costa and sacculus fully separated, remaining connected only at base. Costa varying in shape, short and truncated to crescentic and recurved; spines weakly developed to prominent.

Sacculus rounded, triangular, with a serrated ridge on ventral side in *A. magna*. Aedeagus curved and of unequal width; vesica without cornuti; exhibiting membranous bulbous extension in several species. Octavals absent or consisting of a narrow, weakly sclerotized lip.

The male genitalia of some species of *Acanthovalva* (*capensis*, *bilineata*, *itremo*) are strikingly similar to those of the genus *Narraga* Walker (= *Fernaldella* Hulst) (see Fig. 196 in McGuffin (1972)). The genera are separated, however, by the facies of the adult, the absence of large spurs on the tibia of the prothoracic leg of males of *Acanthovalva*, and structural differences in the aedeagus and antrum.

FEMALE GENITALIA (Figs 745–749). Sterigma and ostial region with rather elaborate sclerotizations. Bursa copulatrix hourglass-shaped to approximately pyriform with short ductus; corpus bursae small and rounded. Wall of bursa membranous and without signum (*A. bilineata*, *A. capensis*) to sparsely (*A. itremo*) and densely spinose (*A. inconspicuaria*).

EARLY STAGES (Fig. 1a). (Only the egg of the type species could be studied.) Resembling the standard

*Chiasmia*-type in shape but more rounded. For a description see below.

DISTRIBUTION. Afro-tropical region including Madagascar; Palaearctic. Probably Oriental (see Remarks). '*Semiothisa*' *eremiata* (Guenée) (Covell, 1984, pl. 50, Fig. 9) from eastern North America is currently misplaced and probably belongs to *Acanthovalva*, so that the genus possibly occurs in the Nearctic region as well.

ETYMOLOGY. From Greek ἄκανθα, ἡ, a thorn, and valva: the valvae are spiniferous. Gender: feminine.

REMARKS. (i) The occurrence of three species of *Acanthovalva* in the Fynbos biome of the Cape Province and Madagascar, respectively, may indicate that this is a phylogenetically old group, although the association may be secondary.

(ii) '*Tephritisina*' *fumosa* Hampson from India (Hindostan and Nilgiris) is probably closely related to *A. bilineata*, although no specimens were examined. If correct, the distribution of *Acanthovalva* would extend into the Oriental region as well.

## Key to species

- 1 Rather brightly coloured moths with brownish-grey fore wings and orange, maculate hind wings (Fig. 31) ..... 6. *focularia* (Geyer), p. 38
- Greyish or brownish moths, with hind wings the same colour as fore wings (Figs 24–30) ..... 2
- 2(1) Whitish-grey moths (Fig. 27). ♂ genitalia (Fig. 502) with costa narrow and somewhat pointed. ♀ genitalia (Fig. 746) with membranous corpus bursae. Endemic to south-western Cape Province ..... 3. *capensis* sp. n., p. 36
- Medium-grey or dark brown moths (Figs 24–26, 28–30). ♂ (Figs 500, 501, 503, 504) and ♀ genitalia (Figs 745, 747, 748) not as above. Variously distributed, two species overlap in range with *capensis* ....
- ..... 3
- 3(2) Medium-grey moths (Figs 24–26). ♂ genitalia (Figs 500, 501) with weakly developed spines on costa and relatively short saccus. ♀ genitalia, where known, as in Fig. 745 ..... 4
- Grey or dark brown moths (Figs 28–30). ♂ genitalia (Figs 503, 504) with prominently developed spines on costa and long saccus. ♀ genitalia as in Figs 747, 748 ..... 5
- 4(3) Adults with line pattern complete to reduced (Figs 24, 25). ♂ genitalia (Fig. 500) with costa and sacculus rounded; ♀ genitalia (Fig. 745) with hour glass-shaped bursa copulatrix; corpus bursae spinose. Widely distributed in Afro-tropical and Palaearctic region ..... 1. *inconspicuaria* (Hübner), p. 34
- Adults with line pattern reduced (Fig. 26). ♂ genitalia (Fig. 501) with costa and sacculus pointed; ♀ unknown. Tanzania ..... 2. *magna* sp. n., p. 35

- 5(3) Dark brownish moths (Figs 29, 30). ♂ genitalia (Fig. 504) with sacculus markedly shorter than costa. ♀ genitalia (Fig. 748) with corpus bursae membranous. Southern Africa, reaching Tanzania in the north ..... 5. *bilineata* (Warren), p. 37
- Grey moths (Fig. 28). ♂ genitalia (Fig. 503) with sacculus as long as costa. ♀ genitalia (Fig. 747) with corpus bursae spinose. Central Madagascar ..... 4. *itremo* sp. n., p. 36

## Descriptions of species

### 1. *Acauthovalva inconspicuaria* (Hübner, [1819]) comb. n.

Figs 24, 25; 500, 745; 969

*Geometra inconspicuaria* Hübner, [1819]: pl. 97, Fig. 500. Type(s), [Europe] (not located in NHMW, M. Lödl, *in litt.*) [not examined]. The identity of the species was determined from Hübner's illustration.

*Eubolia punicaria* Lederer, 1855: 213. Syntypes: 3♂, [Lebanon]: Beirut (not located in NHMW) [not examined]. See Remarks.

*Psanaatodes punicaria* (Lederer); Guenée, [1858]: 108.  $\ddagger$ *Psanaatodes punicaria* (Lederer) var. A Guenée, [1858]: 109. 'Type' ♂, [Ethiopia]: *punicaria* var. A; Type; Museum Paris, Abyssinie, Schimper 1850; 1130–50; *Psamniodes punicaria* var. A Gn. X. 109 pl. 17 Fig. 7 (MNHN) [examined]. Infrasubspecific.

*Selidosema osyaria* Guenée, [1858]: 148. Holotype ♂, [Spain]: Andalusia (not located in BMNH and MNHN) [not examined]. See Remarks.

*Acidalia cinerascens* Butler, 1875: 418. Holotype ♀, [South Africa]: 75.64, Natal; *A. cinerascens* Butler Type (BMNH) [examined].

*Eubolia punicaria* Lederer; Staudinger & Rebel, 1901: 354 (cited as possible synonym of *inconspicuaria*); Spuler, 1910: 118 (as good species); Schmidlin, 1964: 109 (synonymy); Fletcher, 1978a: 78 (as synonym of *inconspicuaria*).

*Tephrina cinerascens* (Butler); Swinhoe, 1904: 511; Hampson, 1909: 121; Janse, 1917: 112; 1932: 241; Prout, 1916b: 160; 1926a: 14; 1935: 10; Rothschild, 1921: 217.

*Tephrina perturbata* Bastelberger, 1908: 74. Holotype ♂, [Namibia]: D[eutsch] S[üd] W[est] Afrika, Gochas, 1904 (G.C. Berger); Type; Originalexemplar J[Ahresbericht] [des] N[assauischen] V[ereins] [für] N[atur] 61 p. 74; *Tephrina perturbata* Bstlbgr. ♂ J.N.V.N. 61 p. 74 [Museum Wiesbaden] [examined]. **Syn. n.**

[*Tephrina cinerescens* (Butler); Hampson, 1910: 469. Misspelling.]

*Tephrina cinnamomaria* Rothschild, 1914: 353. Holotype ♀, [Algeria]: Guelt-es-Stel, 4.X.1913 (Victor Faroult) (BMNH) [examined]. **Syn. n.**

*Tephrina cinnamomaria* Rothschild; Wehrli, 1940: 402.

*Tephrina inconspicuaria* (Hübner); Schmidlin, 1964:

109; Fletcher, 1978a: 78; Hausmann, 1991: 137.

*Selidosema osyaria* Guenée; Fletcher, 1978a: 78 (synonymy).

*Acidalia cinerascens* Butler; Fletcher, 1978a: 78 (synonymy).

FORE WING LENGTH. 8–13 mm (♂), 11–14 mm (♀).

ADULT (Figs 24, 25). Small. Ground colour of wings whitish, densely and evenly suffused with ochreous grey to grey. Lines slightly darker grey, undulating; their development ranging from nearly absent to rather well developed. Discal spots also grey and inconspicuous, larger on fore wing, though frequently faint or totally absent. Wings of male slightly more variegated, postmedian area often with a darker grey fascia. Underside whitish, suffused with ochreous-brown and densely striated with greyish-brown. Markings as on upperside, but fainter. Vestiture of thorax and abdomen grey on upperside, more ochreous beneath. Hind tibia of ♂ not modified. Setal comb on A3 absent.

MALE GENITALIA (Fig. 500). Uncus prominent, acutely pointed; gnathos reduced. Valve massive; costa short and truncated, bearing a row of small spines along termen; sacculus broadly triangular. Saccus weakly developed. Aedeagus gently curved anteriorly, strongly tapering; no cornuti present on vesica. Octavals small, furcate.

FEMALE GENITALIA (Fig. 745). Papillae anales well developed, rounded. Apophyses posteriores thin; a. anteriores somewhat stouter, about two-thirds length of former. Sterigma prominent. Bursa copulatrix small; ductus very broad posteriorly, then narrowing strongly; corpus small, rounded; wall spinose.

EARLY STAGES. Egg: length 0.56 mm, width 0.41 mm (n=3), elliptical with fairly faint hexa- and pentagonal sculpture (Fig. 1a). The egg resembles the standard *Chiasmia*-type in shape but is more rounded; it is green when laid, darkening before eclosion of larva. Oviposition in captivity is difficult to obtain in this species, and the larvae failed to develop.

DIAGNOSIS. The species is superficially similar to 23. *Isturgia exerraria* below, but smaller, with less distinct lines and separated by the plumose antennae of the male. A superficial resemblance exists with 18. *Chiasmia semitecta* (Figs 193–195). From its congeners it can be separated externally by its coloration, which is intermediate between the darker *A. bilineata* (which also has a straight postmedian line) and the lighter, whitish grey *A. capensis*, above, whereas *A. magna*, below, is characterized by its larger size and strongly reduced markings. The differences in the genitalia are pronounced (compare Figs 500 and 501).

BIOLOGY. The species occurs in a wide range of open

habitats, including urban areas. In southern Africa, adults have been collected in January–August and November–December. Unlike many species of Macariini, the female is extremely reluctant to lay eggs in captivity, and the species has not been bred so far.

**DISTRIBUTION** (Fig. 969). Given by Fletcher (1978a: 78) as mediterranean coastal areas eastwards to Baluchistan; Africa. Distributed throughout southern Africa, but apparently absent from interior of Cape Province and Botswana.

**MATERIAL.** 173♂ (4 dissected, TM genitalia slides No. 953, 953a, 11006; slide L 679 (NMBZ)) and 300♀ (1 dissected, TM genitalia slide No. 11007). 1 Munich (ZSBS), 5 Bonn (MAKB), 4 Vienna (NHMW), 319 Pretoria (TM), 11 Pretoria (SANC), 27 Cape Town (SAM), 20 Windhoek (SMWN), 64 Bulawayo (NMBZ), 1 Nairobi (NMKE), 19 N.J. Duke collection, 1 H.S. Staude collection, 1 C. Herbule collection.

**LOCALITIES.** **South Africa, Transvaal:** [Gauteng]: Johannesburg, Witkoppen (3), Pretoria (59), Silverton (2), Roodeplaat (1), Renosterveld, Bronkhorstspruit District (1). [Mpumalanga]: Nelspruit (1), Pilgrim's Rest (1), Fourteen Streams (1), Barberton (1), Kruger National Park: Sabie (1), Skukuza (5), Lower Sabi (4). [Northern Province]: Nylstroom (1), Vyeboom/Nylstroom (1), Woodbush (2), Louis Trichardt (1), Farm Rochdale 500, Zoutpansberg District (1), Pietersburg (1), Kranspoort, Pietersburg Distr. (1), Groot Soutpan, Zoutpansberg (2), Waterberg (9), Mosdene (1), Rooiberg (3), Nylsvley (3), Tzaneen (1), Warmberg (1), Ofcolaco (4), Blyde River Gorge (1), Percy Fyfe Nature Reserve, Potgietersrus District (3), Lemana (1); Kruger National Park: Letaba Camp (31), Orpen (1), Pafuri (2), Shingwidzi (3), Nwanedzi (2), Satara (3), Punda Millia (7). [North-West]: Rustenburg (5), Bloemhof (4), Vryburg (3). **Free State:** Sasolburg (15), Bloemfontein (1), Oranjekrag, H.F. Verwoerd Dam (1), Smithfield (1), Parys (2), Bethlehem (1). **KwaZulu-Natal:** Durban (7), Umhlanga Rocks (2), Muden (1), Warner Beach (1), Mkuzi (2), Victoria District (2), Umkomas (1), M'fongosi (3). **Cape Province:** [Northern Cape]: Pofadder (1), Sishen Mine (1), Buguberg (1), P.K. LeRoux Dam (20), Twee Rivieren (4), Nossob (1), Augrabies (1), Kimberley (3), Langklip/Gordonia (3). [Western Cape]: Clanwilliam (1), Tulbagh Road (1), Oudtshoorn (1), Swellendam (1). [Eastern Cape]: Coerney (1), Port Elizabeth (1), Kowie River (1), Ashton (1), Gamtoos River Mouth (1), Kei Bridge (1), Beacon Bay (2), Umtata (4). Ambiguous: Witteklip (1).

**Swaziland:** Malagwane Hill/Mbabane (3), Mpisi (1). **Namibia:** Gobabeb (18), Husab, Swakop River (2), Hardap Dam, Mariental District (5), Abachaus (12), Kharikas, Welwitschia (1), Karasberge, Farm Noachabib (2), Valencia Farm, Rehoboth District (14), Okahandja (13), Farm Portsmut 33, Windhoek District (1), Karakovisa (3), Kamanjab (2), Otjiverongo, Narebis (2), Ondangu, Ovamboland (1), Kavango, Popa Rapids (1), Ongvati River, Outjo River (1). **Botswana:** 9 m S. Tsau, Ngamiland (1), Kalahari (1), Savuti Channel W. Chobe National Park (1), Khuis op Malopo (1), Mafa (3), Mata Mata (3). **Angola:** S., Mucusso (1). **Zimbabwe:** Harare (Salisbury) (3), Umvumvuma, Mutare (Umtali) District (1), Vumba (22), Hunyani River (1), Darwendale (1), Hot Springs (2), Tod's Hotel (2), Lundi (1), Sawmills (3), Bulawayo (8), Nyamandhlovu (2), Bubye River (7), Doddieburn Ranch, 30 m SW. Nicholson (8), 96 m SE. Nuanetsi (3), 17 m S. Chitrapadzi, Limpopo River (3), Chipinda Pools, Gona-re Zhou Game Reserve (3), Marandellas (2), Chifumbi Cold Springs, Chele Game Reserve (1), Van Niekerk Hotel/Gwai Bridge (1), Victoria Falls (5). **Malawi:** Chipeta Village, Maranga (4). **Moçambique:** 10 m N. Dondo (1), M'gazi/Kombamune (2), Maputo Forest Reserve, 100 km S. of Lourenço Marques (1), 40 m SE. Inhaminga (2), Massangena District, Suve River (1). **Zambia:** 8 m N. Livingstone (2). **Kenya:** Ngong (1). **Ethiopia:** Dare Daua (1). **Morocco:** Ourigane, Haut Atlas (2), Mrassine (1). **Algeria:** Hammam Righa. **[Israel]:** (Syria), Haifa (2). **Syria:** no further data (2).

**REMARKS.** (i) While none of the three male syntypes of *Eubolia puuicaria* Lederer was traced, I examined a series of 2♂ and 2♀ from Israel (then Syria), collected around the time of Lederer's description and determined as *puuicaria*, in NHMW. These are clearly conspecific with *iucouspicuaria*. While the identity of *puuicaria* can thus not be established beyond doubt, I follow Fletcher (1978a) in treating the name as a junior subjective synonym of *iucouspicuaria*.

(ii) The holotype of *Selidosema osyraria* Guenée from Andalusia could likewise not be traced. The description given by Guenée agrees with *iucouspicuaria*, and I follow Fletcher's synonymy.

(iii) Wehrli (1940) described large examples of what he considered to be *iucouspicuaria* from west China as ssp. *tsekubia* Wehrli. I have examined a topotypical ♂ of *tsekubia* (M. Krüger genitalia slide No. 6 (MAKB)) and conclude that these taxa are not conspecific, although closely related.

## 2. *Acanthovalva magna* sp. n.

Figs 26; 501

**TYPE MATERIAL.** Holotype ♂, **Tanzania:** Africa, Tanzania, Katesh, 5900 ft., 29.VI.1965, leg[it] Dr. J. Szunyoghy; Brit. Mus. 1978.107; Geometridae genitalia slide No. 16928 (BMNH). Paratype (1♂). **Tanzania:** *ibidem*, dated 28.VI.1965 (BMNH).

**FORE WING LENGTH.** 13–14 mm (♂).

ADULT ♂ (Fig. 26). Medium-sized. Antennae plumose. Wings mouse grey with coarse, darker grey irroration except along termen of fore wing. Lines reduced, only position of postmedian on fore wing costa marked by a small dark spot. Discal spots present, elongated on fore wing, rounded on hind wing, but not conspicuous; wings otherwise unmarked. Underside whitish grey with even, darker grey irroration, very slightly heavier in postmedian area. Discal spots very faint. Vestiture of thorax and abdomen medium grey, mixed with darker scales. Hind tibia of ♂ not modified. Seta comb on A3 absent.

MALE GENITALIA (Fig. 501). Uncus triagonal, attenuated. Costa of valve narrow and well sclerotized; ventral margin with a broad ridge, bearing short spines. Sacculus broadly triangular, with a small, tringular plate below apex. Tegumen plus vinculum square. Aedeagus small, tapering anteriorly; cornuti absent. A large membranous sac opposite ductus seminalis present. Octavals weakly sclerotized, furcate, with rounded tips.

DIAGNOSIS. Most similar to *A. inconspicuaria*, above, but at once distinguished by its larger size and nearly total reduction of markings.

BIOLOGY. Vegetation at the type locality on Mbulu highland consists of secondary forest (Fletcher, 1978a).

DISTRIBUTION. Known from a single locality in Tanzania.

ETYMOLOGY. From Latin *magnus* (-*a*, -*um*), large; the new species is considerably larger than its congener.

### 3. *Acanthovalva capensis* sp. n.

Figs 27; 502, 746; 970

TYPE MATERIAL. Holotype ♂, [South Africa, Northern Cape]: Nababiep, 13.–14.VIII.1961 (van Son & Vári); TM Lep[idoptera] Het[erocera] Genitalia slide No. 11058 (TM). Paratypes (16♂, 12♀): South Africa: 2♀, same data as holotype, TM Lep. Het. Genitalia slide No. 11059; 2♂, 1♀, *ibidem*, dated 30.VIII.–2.IX.1962 (Vári & Goode). [Western Cape]: 2♂, 2♀, Algeria Forestry, Clanwilliam Distr[ict], dated 18.–20.X.1971 (Jones & Snyman) (1♂), and 4.–10.III.1969 (Potgieter & Strydom) (1♂, 2♀); 6♂, 2♀, C[ape] P[rovince], Yzerfontein (N.J. Duke), dated 2.XI.[19]77 (2♂, 6.I.[19]78 (4♂); 3♂, 1♀, *ibidem*, dated 6.I.1978; 1♂, Mt. on NE side of top of Cedar Pass, Ceda [sic] Berg, 9.I.1962. [Northern Cape]: 1♀, Anenous, 3.IX.1962 (Vári & Goode); 1♀, 9 m[iles] South of Springbok, 18.–20.X.1954 (A.J.T. Janse); 2♂, C[ape] P[rovince], Studer's Pass, Garries, 13.IX.[19]77 (N.J. Duke).– (TM, NMBZ, N.J. Duke collection).

FORE WING LENGTH. 9–11 mm (♂), 8–12 mm (♀).

ADULT (Fig. 27). Ground colour of wings whitish, suffused with whitish grey and finely speckled with black. Lines variously developed, their position marked by a black spot on costa of fore wing. Postmedian line in some specimens bordered distally by a whitish fascia. Discal spots blackish, larger on fore wing. Underside whitish, densely suffused with grey and with intense dark grey dusting/striation. Body grey. Hind tibia of ♂ not modified. Seta comb on A3 absent.

MALE GENITALIA (Fig. 502). Uncus spinose (the central, larger pair of spines not homologous to uncus horns in other Macariini). Costa and sacculus well separated. Costa narrow, curved, its outer margin adorned with numerous spines; sacculus triangular, pointing downward. Saccus prominent, ending in rounded tip. Aedeagus slender and elongated, curved; ventrally with a conspicuous bulbous extension. Octavals appearing as a narrow sclerotized lip.

FEMALE GENITALIA (Fig. 746). Papillae anales fairly large, rounded. Apophyses posteriores long and thin, a. anteriores very short. Sterigma as illustrated. Antrum short. Bursa copulatrix small, pear-shaped, without signum.

DIAGNOSIS. The species is similar to the very widespread *A. inconspicuaria*, below, but is easily separated by its much lighter, whitish grey colour; furthermore, *A. capensis* is confined to the south-western Cape Province.

BIOLOGY. The species was collected by N.J. Duke (*pers. comm.*) in moist localities near the coast, where the vegetation was dominated by Mesembryanthemaceae and fynbos elements. Adults have been collected in March and from August to October.

DISTRIBUTION (Fig. 970). Endemic to Western and Northern Cape Province, South Africa.

ETYMOLOGY. From Latin *capensis* (-*e*), pertaining to the Cape; the species is endemic to the region.

### 4. *Acanthovalva itremo* sp. n.

Figs 28; 503, 747

TYPE MATERIAL. Holotype ♂, Madagascar: Centre, massif de l'itremo, 1615 m, 7/12–I–1973 (P. Griveaud); genitalia slide M. Krüger No. 14 (MNHN). Paratypes (3♂, 3♀). Madagascar: 1♂, Madagascar Centre, Ambatofinandrahana, 1180 m, 26–VII–[19]57 (P. Griv[eaud]); 1♂, Madagascar Central, Forêt d'Ambahona, 1850 m (P. Viette), (genitalia slide M. Krüger No. 29); 1♂, Madagascar Sud, Rés[erve] nat[urelle] int[égrale] 10, Lac Tsimanampetsotsa, 7/10. II. 1969 (P. Viette et P. Griveaud); 1♀, Madagascar Sud,

14 km S. de Beloha, piste de Lavanono, 3/5.III.1968 (P. Griveaud); 1♀, Madagascar Sud, plateau Mahafaly, 11/12 km Ouest d'Ankalirano, 250 m, 14/17.I.1974 (P. Viette et A. Peyrieras); 1♀, Madagascar Sud, cordon littoral Mahafaly, env[irons] de Efoetsy, 10 m, 30.XI.-3.XII.1967 (P. Griveaud).—(MNHN).

FORE WING LENGTH. 9–11 mm (♂), 10–12 mm (♀).

ADULT (Fig. 28). Small. Wings evenly suffused with mouse grey, with additional darker grey dusting. Discal spots grey, inconspicuous. The three convex lines on fore wing fine, grey, running parallel to termen. Hind wing similar, but basal line reduced. Underside of wings similar, but less heavily dusted, appearing more whitish (particularly on hind wing and along costa of fore wing). Vestiture of body concolorous with wings. Hind tibia of ♂ not dilated. A3 lost in genitalia slide of holotype.

MALE GENITALIA (Fig. 503). Uncus with spines arranged in two rows. Costa of valve short, spoon-shaped, bearing several groups of spines on outer margin. Sacculus triangular, spines present in a small apical group. Saccus drawn into long tip. Aedeagus elongated, broadest medially, curved anteriorly; vesica lacking cornuti. A membranous sac present in apical half. Octavals absent, but central portion of A8 with somewhat denser sclerotization (see figure).

FEMALE GENITALIA (Fig. 747). Papillae anales normally developed. Apophyses posteriores rather thin; a. anteriores stouter, reaching approximately two-thirds length of former. Sterigma well developed, crescentic, with roughly circular internal structures. Bursa somewhat hour glass-shaped with funnel-shaped ductus and small, rounded corpus bursae; wall of corpus densely and evenly spinose.

DIAGNOSIS. The species most closely resembles *A. inconspicuaria*, but is smaller and characterized by the evenly convex lines on the wings which are slightly undulating in *inconspicuaria*.

BIOLOGY. Adults are active December–March and in July. The observed altitudinal range is 10–1850 m.

DISTRIBUTION. Central and southern Madagascar, local.

ETYMOLOGY. Named after the type-locality.

##### **5. *Acanthovalva bilineata* (Warren, 1895) comb. n.**

Figs 29, 30; 504, 748; 970

*Ematura bilineata* Warren, 1895: 129. Holotype ♂, [South Africa]: Felder Coll[ection]; *Ematura bilineata* Warr. ♂ Type (BMNH) [examined].

*Tephritis antennata* Warren, 1897b: 399. LECTOTYPE ♂, here designated, [South Africa]: Rustenburg,

Sept[ember] Oct[ober] [18]94, Ayres leg[it]; Rothschild Bequest B.M. 1939–1; IV.399; *Tephritis antennata* Warr. ♂ type; Geometridae genitalia slide No. 9670 (BMNH) [examined]. Synonymized by Fletcher, 1978a: 78.

*Tephritis bilineata* (Warren); Prout, 1932a: 484; Fletcher, 1978a: 78.

*Tephritis antennata* Warren; Janse, 1917: 112; 1932: 241; Herbulot, 1956: 248 (as good species); Fletcher, 1978a: 78 (synonymy).

FORE WING LENGTH. 9–12 mm (♂), 10–11 mm (♀).

ADULT (Figs 29, 30). General appearance very dark, blackish-brown. Ground colour of wings whitish, but very densely and evenly suffused. Basal and median line faint to prominent, postmedian usually well developed, not undulating as in preceding species. Discal spots faint. Underside ochreous, densely striated with greyish brown; discal spots and postmedian line moderately well developed. Thorax and abdomen concolorous with wings, dark brownish grey on upper-, and ochreous on underside. Hind tibia of ♂ not modified. Seta comb on A3 absent.

MALE GENITALIA (Fig. 504). Uncus peculiarly modified, its base extending anteriorly into tegumen. Costa and sacculus well separated. Posterior half of costa greatly dilated, triangular, and bearing numerous denticles; sacculus much smaller. Saccus large and pointed. Aedeagus slender and curved, with a conspicuous bulbous ventral extension. Octavals absent.

FEMALE GENITALIA (Fig. 748). Papillae anales large, well rounded. Both pairs of apophyses thin, a. anteriores less than half length of a. posteriores. Sclerotizations of sterigma as in figure. Bursa copulatrix somewhat pear-shaped; ductus short and rather wide, abruptly widening into corpus. Signum absent.

DIAGNOSIS. Easily recognized by its very dark brown (rather than grey) coloration and the straight postmedian line on both wings. The ochreous colour of the underside of the wings is also useful in recognizing this species.

BIOLOGY. The species is uncommon in collections, but seems to occur widely in open habitats, particularly savanna. Adults have been collected January–July, in September and in December.

DISTRIBUTION (Fig. 970). In southern Africa widely distributed in Zimbabwe and the Transvaal; in Moçambique, KwaZulu-Natal and Cape Province mostly coastal. Northwards in Zambia and distributed to Kenya (Fletcher, 1978a). Records from Madagascar are erroneous and refer to *A. itremo*, below.

MATERIAL. 23♂ (3 dissected, TM genitalia slides No. 954, 954a, 11008) and 29♀ (1 dissected, TM genitalia slide No. 11009). 1 Munich (ZSBS), 39 Pre-

toria (TM), 1 Pretoria (SANC), 3 Cape Town, 7 N.J. Duke collection, 1 D.M. Kroon collection.

**LOCALITIES.** **South Africa, Transvaal:** [Gauteng]: Pretoria (1). [North-West]: Rustenburg (1). [Northern Province]: Woodbush (1), Entabeni Forest (1), Doornhoek Farm (1). Slypsteendrift/New Smitsdorp (1), Rooiberg (1); Kruger National Park: Orpen (1), Satara (3). [Mpumalanga]: Nelspruit (1), Barberton (10), Kruger National Park: Pretoriuskop (1), Skukuza (1). **KwaZulu-Natal:** Durban (1), Nyalazi Forest (1), Sordwana Bay (1), Scottburgh (1). **Cape Province:** [Eastern Cape]: Fort Beaufort (1), East London (2), Humewood (1). [Western Cape]: Tulbagh Road (1), Hermanus (2). **Zimbabwe:** Harare (Salisbury) (8), Sinoia (1), Gwela (1), Mutare (Umtali) (1). Bulawayo (2), Victoria Falls Camp (1). **Zambia:** Broken Hill (1). **Moçambique:** San Martinho (1). **Tanzania:** Kigonsera (1).

**REMARKS.** (i) Regarding the type locality of *A. bilineata*, Warren states that the description is based on 'one ♂ from the Felder coll, without a label itself, but placed along with several insects from Knysna, South Africa'. (ii) The two female syntypes of *T. antennata* from Dar-es-Salaam mentioned in the original description were not traced in BMNH.

## 6. *Acanthovalva focularia* (Geyer, 1837) comb. n.

Figs 31; 505, 749; 969

*Eurranthis* (*Catograpta*) *focularia* Geyer, 1837: pl. 6.

Figs 855, 856. Type(s): not examined (lost?). The species is characteristically marked and its identity not in doubt.

*Fidonia focularia* (Geyer); Guenée, [1858]: 156; Walker, 1862: 1035.

*Isturgia focularia* (Hübner-Geyer); Janse, 1932: 160; Pinhey, 1975: 83.

**FORE WING LENGTH.** 9–14 mm (♂), 9–12 mm (♀).

**ADULT** (Fig. 31). Forewings pale to medium brown with fine, uneven greyish brown striation. Four lines (basal, median, postmedian and subterminal) present on forewing but usually incomplete; median and subterminal lines relatively best developed. Position of lines marked by dark greyish brown maculae on forewing costa. Hind wings pale orange in males, bright orange in females, showing varying degrees of dark striation. Three transverse lines present on hind wings, commonly broken up into a series of dark brown spots; median line relatively most complete. Discal spots well developed on both wings but frequently obscured due to their inclusion in the middle line. Cilia greyish brown on both wings. Underside yellowish orange to orange with dark maculation showing through. Vestiture of thorax and abdomen ochreous to greyish.—Hindtibia of male not dilated or bearing hair-pencil.

**MALE GENITALIA** (Fig. 505). Uncus well developed, truncated apically and cleft so as to form three lobes, with the middle lobe short and pointed. Gnathos absent. Costa of valve forming a slender arm, with a rather conspicuous 'hump' near middle; sacculus short, broadly rounded. Juxta well defined, trapezoidal. Sacculus extended into a long tip. Aedeagus long and thin, gently curved anteriorly; vesica without cornuti. Octavals absent.

**FEMALE GENITALIA** (Fig. 749). Papillae anales small. Apophyses thin; a. posteriores between two and three times the length of a. anteriores. Sterigma well developed, resembling an inverted triangle; position of ostium bursae marked by a small and weakly sclerotized cone-shaped structure. Bursa copulatrix with unusual shape: ductus bursae long and slender, widening abruptly into medium-sized, rounded corpus; posteriorly, a rounded, membranous extension of uncertain derivation and equalling corpus bursae in size present.

**DIAGNOSIS.** Adults are of the same size as *A. inconspicnaria*, but are readily identified by their orange hind wings. *A. focularia* cannot be confused with any other southern African geometrid.

**BIOLOGY.** Adults are both diurnal and nocturnal (H.S. Staude, *pers. comn.*) and are active throughout the year.

**DISTRIBUTION** (Fig. 971). South Africa, recorded from North-West Province, the Free State and Eastern, Western and Northern Cape Provinces. Namibia.

**MATERIAL.** 172 ♂ (3 dissected, TM Lep. Het. genitalia slides Nos. 1014, 10724, 11287; wing slides Nos. 885, 885a) and 23 ♀ (1 dissected, TM Lep. Het. genitalia slide No. 11288). 195 Pretoria (TM).

**LOCALITIES.** **South Africa, Transvaal:** [North-West]: Bloemhof (1). **Free State:** no further data (3), Bloemfontein (6), Zastrand, Farm Maghaleen (1), Oranje krag, H. F. Verwoerd Dam (44). **Cape Province:** [Eastern Cape]: Port Elizabeth (4), Zuurberg Pass (1), Uitenhage (4), Resolution, Albany District (18), Willowmore (4), Grahamstown (3), Eagle's Crag (2), Hogback (1), Knysna (1), Tsitsikama, Goesabos Forestry (2), Addo National Park (1), Aliwal North (4), Steynsburg (1), Farm Helpmekaar, 14 km E. of Middelburg (2), P.K. le Roux Dam, Van der Kloof (13). [Northern Cape]: Boegoeburg (1), Kookfontein (1), Wallekraal (3), Soebatsfontein (2), Warrington (?= Warrenton) (1), Kuruman to Griquatown (3), Griquatown to Prieska (1), Pofadder (4), Wolfhok (1), Hopetown, Farm Slypsteen (1), Orania (4), Colesberg (2), Springbok (2), Vioolsdrif (1). [Western Cape]: Vredendal (4), de Wet, Worcester (1), Worcester, Fairy Glen (9), Worcester, Amandel spruit (1), Breërivier (1), Malmesbury (2), Saasveld (1), Kotzesrus (7), Klein Klipheuvel (1), Hoekbaai (4), Rooidam farm (3), Farm

Wiedouw nr. Vanrhynsdorp (2), Gifberg nr. Vanrhynsdorp (4), Citrusdal (1). **Namibia:** Rehoboth (1), Bullspoort (1), Keetmanshoop (1). Ambiguous: Still Bay (2), Bushman's River Station (2), Waterford (2), Klipplaat (2).

## 2. Genus *NARRAGA* Walker, 1861

*Narraga* Walker, 1861: 948 (key). Nomenclaturally available, but without included species until Walker, 1862, *ibidem* 24:1031. Type species: *Geometra cebraria* Hübner, [1799] 1796: pl. 24, Fig. 129, by subsequent monotypy. Type locality: **Europe**.

*Geometra cebraria* is a junior subjective synonym of *Phalaena fasciolaria* Hufnagel, 1767: 516 (Fletcher, 1979).

*Narraga* Walker; Prout in Seitz, 1915b: 397; Warnecke, 1939: 384 (as *Fidonia*); Wehrli in Seitz, 1940: 393; Moucha & Povolny, 1957: 218; Povolny & Moucha, 1959: 453; McGuffin, 1972: 13.

GENERAL APPEARANCE (Figs 32, 33). Small to barely medium-sized, generally brown Macariini with pale yellow to whitish markings. Wings showing pattern of four transverse bands on forewing and three on hind wing; discal spots present but indistinct. Underside, especially of hind wings, mottled in a conspicuous fashion. Cilia chequered. Head: antennae of male bipectinate; antennae of female filiform, rather robust. Frons weakly convex. Labial palpi porrect, 1.5 times diameter of eyes in length; particularly in male with rough scales. Proboscis weak. Chaetosemata extended in form of a broad band across head. Legs: hind tibia of male not dilated or bearing hair-pencil. Wings held folded over the back in rest.

VENATION. Forewing: Sc and R<sub>1+2</sub> anastomosing for some distance beyond cell; R<sub>1+2</sub> and R<sub>3+4</sub> also anastomosing for a short distance. Cell short, about four-tenths length of wing. Media, Cubitus and Analis as in other Macariini. Fovea absent. Hind wing: Sc+R<sub>1</sub> and Rs approaching each other (*nelvae*, *partitaria*) or anastomosing (*fasciolaria*); Rs and M<sub>1</sub> stalked. A<sub>1</sub> complete, reaching anal angle.

MALE GENITALIA (Fig. 506). *Eurasian species*: uncus pointed, slightly beak-like; setae well-developed but not spine-like; 'horns' absent. Gnathos with well-developed arms and medial element. Valva divided, sometimes deeply, but not completely divided into costa and sacculus (in Nearctic species small notch on costa); saccus long. *Nearctic species*: uncus triangular, 'horns' absent; gnathos weak. Valva deeply excavated, 'yawning' in *filmetaria*; more like Eurasian species in *N. georgiana*, costa with small notch (Scoble & Krüger, *in prep.*). Posterior margin of A<sub>8</sub> emarginated.

FEMALE GENITALIA (Fig. 750). Antrum well developed, long. Bursa copulatrix spinose or membranous, if the latter, with or without a small stellate signum.

DISTRIBUTION. Holarctic. Across Palaearctic Region, including North Africa, but absent from many areas. In North America mostly in Rocky Mountains and Georgia.

## Description of species

### 1. *Narraga nelvae nelvae* (Rothschild, 1912)

Figs 32, 33; 506, 750

*Fidonia nelvae* Rothschild, 1912: 126. Lectotype ♂,

**Algeria:** Type; Batna, Nelva leg; *Fidonia nelvae* Rothschild. Type; Rothschild Bequest B.M. 1939-1 (BMNH) [examined]. Paralectotypes (4 ♀). **Algeria:** same data as holotype (BMNH) [examined].

*Fidonia nelvae* Rothschild; Rothschild, 1914: 351.

*Narraga nelvae* (Rothschild); Prout in Seitz, 1915b: 397; Rungg, 1967: 109; 1981: 262.

FORE WING LENGTH. 9–11 mm (♂), 10–12 mm (♀).

ADULT (Figs 32, 33). Small moths. Termen of both forewings and hind wings rounded. Antennae with alternating cream and brown segments. Ground colour of wings cream white. Forewings with four not very distinct transverse brown bands and some coarse irroration of the same colour; hind wings with three such bands. Discal spots very faint. Cilia white, chequered with brown. Wings of males densely clouded with brown, hence markings appearing more distinct in females. Underside showing similar pattern of bands on chalk-white ground. Forewings of male suffused with brown except for costal region; hind wing without suffusion. Vestiture of thorax and abdomen medium to dark brown, mixed with yellowish white scales. Hindtibia of male not modified.

MALE GENITALIA (Fig. 506). Uncus well developed, arising from broad base, with pointed, beak-like apex. Gnathos with broad arms and large, pointed and recurved medial element; internal surface of medial element finely serrated. Genital capsule broadly fusiform, with long saccus. Valva deeply devided, with narrow, arm-like costa and triangular sacculus bearing a single sclerotized midventral tooth. Surface of valvae with groups of setae but lacking spines. Juxta taking the shape of a posteriorly open ring. Aedeagus somewhat doorhandle-shaped, with a long and pointed apex and a bulbous base. Vesica lacking cornuti.

FEMALE GENITALIA (Fig. 750). Papillae anales elliptical, rather sparsely setose. Apophyses stout for the group, a. anteriores about two-thirds length of a. posteriores. Sterigma very prominent, resembling a wide, posteriorly notched trough, housing the posterior, sclerotized, dome-like section of the antrum. Anterior portion of antrum curved, more tube-like and

equally well sclerotized. Bursa copulatrix proper pear-shaped and membranous, the bursal wall very delicate. Signum absent.

**DIAGNOSIS.** Similar to *Narraga fasciolaria*, the type species, but with broader wings; the two occur sympatrically only in Spain.

**BIOLOGY.** Adults have been collected in April and from June to September.

**DISTRIBUTION.** Algeria and Morocco. In Spain represented by ssp. *catalaunica* Herbuleot, adults of which are darker.

**MATERIAL.** 27♂ (1 dissected, BM Geometridae genitalia slide No. 19987) and 19♀ (1 dissected, BM Geometridae genitalia slide No. 19988). 24 London (BMNH), 22 Bonn (MAKB).

**LOCALITIES.** **Algeria:** no further data (2), Batna (3), Prov. Oran, Sebdou (14), Zebch near Sebdou (1), El Aouedje près Sebdou (5), Lambese (20); Algiers (1).

### 3. Genus PLATEOPLIA Warren, 1909

*Plateoplia* Warren, 1909: 120. Type species: *Tephritis ochriciliata* Warren, 1901: 214, by original designation. Type locality: **Angola**. The genus is monotypic.

**GENERAL APPEARANCE** (Fig. 34). Medium-sized, yellowish-ochre platypeplines with rounded wings. Line pattern simple, consisting of basal, median and postmedian line on fore wing and median and postmedian on hind wing; all lines distinct but very fine. Head: antennae of ♂ serrate with flattened serrations ending in fascicles of short, curled cilia; antennae of ♀ ciliate. Frons smooth. Labial palpi short, slightly drooping, about diameter of eyes. Proboscis weak. Legs: hind tibia of ♂ not modified.

**VENATION** (Fig. 11). Fore wing: R1 anastomosing with Sc for a long distance, then briefly free and anastomosing again with stalk of R2–4; R2 and R3 coincident; R3–5 stalked; 1A and 2A separate near base of wing; fovea present. Hind wing: Sc+R1 and Rs approximated and connected through short bar; 2A absent.

**MALE GENITALIA** (Fig. 507). The male genitalia provide two autapomorphies unique to *Plateoplia*, (i) the hammer-headed costa, which exhibits a short and curved ventral process and (ii) the long, digitate process present at the tip of the sacculus. For a detailed description see below.

**FEMALE GENITALIA** (Fig. 751). Sclerotizations of sterigma around ostium complex. Bursa copulatrix elongated, ductus quite short. Wall of corpus bursae membranous throughout; signum consisting of a single, small sclerotized tooth near centre.

**DISTRIBUTION.** Southern Africa.

### Description of species

#### 1. *Plateoplia acrobelia* (Wallengren, 1875)

Figs 34; 507, 751; 971

*Tephritis acrobelia* Wallengren, 1875: 122. Holotype ♀,

[**South Africa:**] Transvaal (not traced in NRS or UZIL) [not examined]. The diagnosis provided by Wallengren is adequate to recognize this species.

*Pristostegania flavata* Warren, 1897a: 81. Holotype ♂,

[**South Africa:**] Weenen, Natal, II.[18]94; *Pristostegania flavata* Warr. Type ♂; Rothschild Bequest B.M. 1939–1 (BMNH) [examined].

*Tephritis ochriciliata* Warren, 1901: 214.

LECTOTYPE ♂, here designated, **Angola:** Cubal River, April [18]99 (Penrice); *Tephritis ochriciliata* Warr. ♂ type; Rothschild Bequest B.M. 1939–1 (BMNH) [examined]. **Syn. n.**

*Tephritis ochriciliata* (Warren); Hampson, 1910: 469.

*Tephritis acrobelia* Wallengren; Janse, 1917: 112.

*Plateoplia flavata* (Warren); Janse, 1917: 115.

*Plateoplia acrobelia* (Warren); Janse, 1932: 201.

*Pristostegania flavata* Warren; Janse, 1932: 202 (synonymy).

**FORE WING LENGTH.** 9–11 mm (♂), 10–12 mm (♀).

**ADULT** (Fig. 34). Small, with well-rounded wings. Ground colour of wings whitish, evenly suffused with ochreous yellow, only rarely ochreous, and with faint darker dusting. Postmedian area in most, but not all, specimens somewhat darker. All three lines present, very fine and more or less straight; basal line absent on hind wing. Discal spots absent. Underside yellowish with coarse brown striations; median and postmedian line prominent, other markings absent. Vestiture of thorax and body yellowish. Hind tibia of ♂ not modified. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 507). Uncus massive, acuminate, arising from broad base. Gnathos cingulate, with large, triangular medial element. Valve deeply cleft, but costa and sacculus connected at base; groups of small spines present on uncus, costa and sacculus. Costa hammer-shaped, with short and curved ventral process. Sacculus slightly shorter and broader than costa, apex extended into a slender digitate process, and with a small subapical group of spines. Tegumen and vinculum markedly less sclerotized than valves; saccus short, broadly rounded. Aedeagus massive, fusiform; vesica without cornuti. Octavals consisting of a narrow, sclerotized bar on distal margin of A8.

**FEMALE GENITALIA** (Fig. 751). Papillae anales well developed, rounded. Both pairs of apophyses fairly short and weak; a. anteriores one-third length of a. posteriores. Structure of sterigma and ostium complex. Bursa copulatrix oval, membranous throughout. Sig-

num minute, consisting of a single, short, sclerotized tooth.

**EARLY STAGES.** The following description of an adult larva and a pupa was made after colour slides provided by H.S. Staude. Larva. Characterized by strongly swollen thorax. Body dark brown dorsally and laterally, blackish-brown laterally between median and ventral lines, finely maculated with white throughout. Median line fine and undulating, orange, absent from thorax and posterior abdominal segments. Ventral line not well developed, dark. Underside of body and dorsal aspect of head whitish. Thoracic legs black-and-white. Pupa. Fusiform, slender, with pointed abdomen and cremaster. Head and thorax dark brown, with antennae and eyes lighter; abdomen light brown with coarse dark brown maculation.

**DIAGNOSIS.** A characteristic species, easily separated from *Sphyrocosta madecassa*, below, by the serrated or ciliate antennae (bipectinate in both sexes of *madecassa*). Members of *Platypepla* below are superficially similar but can be immediately identified by their much narrower and pointed fore wings and the presence of dark spots along the costa.

**BIOLOGY.** *P. acrobelia* is rather widely distributed in southern Africa, though never common; it occurs in a range of different habitats, but seems to favour savanna. Adults have been collected from January–May and in September–December. The larva has been found on *Ximenia americana* L. (Olacaceae), but readily accepts *X. caffra* Sond. in captivity.

**DISTRIBUTION** (Fig. 971). In southern Africa throughout KwaZulu-Natal and Transvaal provinces, and between 17° and 20°S across northern Namibia, Botswana, Zimbabwe, and Moçambique. Further in Angola and East Africa (Zambia, Tanzania, Kenya, Uganda).

**MATERIAL.** 92♂ (2 dissected, TM genitalia slides No. 986, 10997) and 40♀ (1 dissected, TM genitalia slide No. 11096). 6 Nairobi (NMKE), 84 Pretoria (TM), 4 Cape Town (SAM), 29 Bulawayo (NMBZ), 9 N.J. Duke collection.

**LOCALITIES.** **South Africa, Transvaal:** [Gauteng]: Pretoria (17). [North-West]: Rustenburg (2). [Mpumalanga]: Barberton (3), Nelspruit (1), Pretoriuskop (2), White River (1), Matjulwana (1), Skukuza (1). [Northern Province]: Nylsvlei/Naboomspruit (1), New Smitsdorp (1), Three Sisters (1), Ofcolaco (1), Nylstroom (2), Wyllie's Poort (1), Farm Rochdale 700, Zoutpansberg District (1), Elandshoek (2); Kruger National Park: Punda Milia (4), Nwanedzi (3), Letaba Camp (1). Ambiguous: Rietfontein (1). **Cape Province:** [Northern Cape]: Blauwkop (1). **KwaZulu-Natal:** Durban (1), Stella Bush (1), New Hanover (1), Magude (2), St. Lucia

Lake (1), Dukuduku Forest (2), Mkuzi (1), Ndumu (3), M'fongosi (2), Jozini Dam, Lebombo Mts (4), Ingwavuma (1). **Swaziland:** Bulungu Mts (1). **Namibia:** Abachaus (4), Sangwali, E. Caprivi (2), Omuramba Tamsu, Okavango (1). **Namibia/Angola:** Ovamboland (1). **Botswana:** Maun (1), Crocodile Camp/Maun (6), 8 m N. Maun (2), 16 km NE. Maun (2), Chobe Rapids, Kasane (1), Thamalakane River, Maun (5), Makala-ma-Bedi, Botletle River (1), Sepopa, Ngamiland (2), Four River Camp, Okavango (2). **Zimbabwe:** Hunyani River (2), Mazoe (1), Harare (Salisbury) (2), Umtali (Mutare) District (4), Lowdale (1), Laurenceville, Vumba (2), Bulawayo (1), Katambora Rapids, Zambezi (1), Chipinda Pools, Gana-re-Zhou Game Reserve (2), Deka River, 5 m NE. Wankie (1), Victoria Falls (1), Marandellas (1), Doddieburn Ranch (4). **Moçambique:** Amatonga Forest, Gondola (1), Chiluvo Hills (1). **Zambia:** Abercorn (1). **Uganda:** Bwamba (1). **Tanzania:** Oldcani (1). **Kenya:** Tiwi Mombasa (1), Coast, Shimba Hills (1), Coast, Gazi Forest (1), Kongolia, Suk (1).

#### 4. Genus *SPHYROCOSTA* gen. n.

Type species: *Xenostega madecassa* Viette, 1973: 160, by present designation. Type locality: **Madagascar**. The genus is monotypic.

**GENERAL APPEARANCE** (Figs 35, 36). Rather small, yellowish-orange (♂) or brownish-orange (♀) platycerines with slightly pointed wings. The ♂ resembles adults of *Plateopia acrobelia*, above. Line pattern simple, consisting of basal, median and postmedian line on fore wing and median and postmedian on hind wing; all lines very fine and fairly indistinct. Sexes dimorphic, the ♀ being smaller, with narrower wings. Head: antennae bipectinate, with shorter pectinations in ♀. Frons smooth. Labial palpi short, slightly drooping, about 1.5 times diameter of eyes. Proboscis weak. Legs: hind tibia of ♂ not modified.

**VENATION.** Fore wing: Sc anastomosing with R1 for a short distance near end of cell, then free. R1+2 and R3+4 stalked; R5 free. 2A free for a short distance near base of wing. Fovea absent. Hind wing: Sc+R1 and Rs approximated beyond middle of cell but not anastomosing. 2A absent.

**MALE GENITALIA** (Fig. 508). These provide two apomorphies for the genus, (i) the combination of a hammer-headed costa without ventral process and a rather small, triangular sacculus and (ii) the presence of a doorhandle-shaped, apically trifurcate cornutus on the vesica. For a detailed description see below.

**FEMALE GENITALIA** (Fig. 752). Characterized by a very small, membranous bursa copulatrix and a complex sterigma. Apophyses anteriores very short, between one-third and one-fourth length of a. posteriores. For a detailed description see below.

DISTRIBUTION. Madagascar.

ETYMOLOGY. From Greek σφύρα, ἥ, a hammer, and *costa*: the hammer-headed costa in the male genitalia is diagnostic.

## Description of species

### 1. *Sphyrocosta madecassa* (Viette, 1973) comb. n.

Figs 35, 36; 508, 752

*Xenostega madecassa* Viette, 1973: 160. Holotype ♂,

**Madagascar:** Ouest, route nationale 7, 64 km à l'Est de Tuléar, forêt d'Andranovory, 500 m, 15/21-I-1969 (P. Viette et P. Griveaud) (MNHN) [examined by Dr J. Minet, MNHN].

FORE WING LENGTH. 12 mm (♂), 11 mm (♀).

ADULT (Figs 35, 36). Sexually dimorphic. Antennae bipectinate, with rather short pectinations in ♀.- ♂: wings ample, fore wings slightly pointed. Ground colour vividly yellowish orange, with some slightly darker suffusion in postmedian area. Fore wing with basal and postmedian line, hind wing with median and postmedian; all lines very fine, brownish. Discal spots small on fore wing, minute on hind wing. Underside similar but with intense brownish striation; lines better developed compared with upperside. ♀: wings narrow; apex of fore wing pointed. Ground colour ochreous-orange, suffused with light brown, particularly on fore wing. Markings largely obliterated; discal spots on fore wing and median line on hind wing discernible. Underside much paler, yellowish ochre with fine dark dusting; markings confined to discal spots on fore- and median line on hind wing. Vestiture of thorax and abdomen concolorous with wings, paler on underside.- Hind tibia of ♂ not modified. Setal comb on A3 absent.

MALE GENITALIA (Fig. 508). Uncus large and triangular, arising from broad base and terminating in a small, acute point. Gnathos reduced. Valves with costa and sacculus entirely separated. Costa robust, hammer-headed and angled at about 90°. Sacculus smaller, triangular. Aedeagus straight and somewhat tapering anteriorly; rather large relative to size of genitalia. Vesica bearing a single, doorhandle-shaped apical cornutus. Octavals well developed, furcate, with acutely pointed tips.

FEMALE GENITALIA (Fig. 752). Papillae anales prominent, rounded. Apophyses moderately strong; a. anteriores very much shorter than a. posteriores. Sterigma rather elaborate (cf. figure); operculum present. Bursacopulatrix pyriform, with a delicate membranous wall.

DIAGNOSIS. In facies, males of *S. madecassa* resemble *Plateopia acrobelia*, above. The species is,

however, more delicate in appearance and the smaller, brown females are quite distinct. Differences in genitalic structure are evident from the illustrations (compare Figs 507, 508 and 751, 752). Furthermore, *S. madecassa* is endemic to Madagascar, while *P. acrobelia* is confined to southern Africa.

BIOLOGY. Apparently associated with rather arid habitats. Adults have been collected in January at elevations around 500 m.

DISTRIBUTION. Western Madagascar.

MATERIAL. 1 ♂ (dissected, genitalia slide M. Krüger No. 31 (MNHN)) and 1 ♀ (dissected, genitalia slide M. Krüger No. 32 (MNHN)). 2 Paris (MNHN).

LOCALITIES. **Madagascar:** Ouest, Route nationale 7, 64 km E. de Tuléar, forêt d'Andranovary, 500 m (1); Sud, cordon littoral Mahafaly, env[irons] d'Efoetsy, 10 m (1). Further records (see original description). Réserve naturelle intégrale no. 10 du lac Tsimanampetsotsa; bordure occidentale du plateau Mahafaly, 5 km à l'Est d'Itampolo.

### 5. Genus *Milocera* Swinhoe, 1904

*Milocera* Swinhoe, 1904: 522. Type species: *Milocera horaria* Swinhoe, 1904, *ibidem*: 522, by original monotypy. Type locality: Madagascar (Fletcher, 1979).

*Milocera* Swinhoe; Janse, 1932: 245.

GENERAL APPEARANCE (Figs 37-64). Small to medium-sized, Drepidae-like platypeplines (fore wing length 9-17 mm). Fore wing arched, pointed and frequently falcate; hind wings ample and rounded. Colours range from ochreous and yellow to various shades of brown. Line pattern simple, usually consisting of convex, often zigzagging basal and oblique postmedian line on fore wing and oblique postmedian on hind wing. Discal spots faint or absent. Head: antennae ciliate to subserrate, thinner in ♀. Frons smooth, oblique. Labial palpi short and porrect, obtuse, about diameter of eyes. Proboscis well developed. Leg: hind tibia of ♂ unmodified or dilated and bearing hair-pencil.

VENATION (Fig. 12). In fore wing, Sc and R<sub>1+2</sub> anastomosing for a long distance; R<sub>3-5</sub> stalked; 1A and 2A separate for a short distance near wing base, then fused; fovea absent. In hind wing, Sc+R<sub>1</sub> and Rs approximated and running parallel for some distance, but not anastomosing; 2A present, but not reaching far beyond cell.

MALE GENITALIA (Figs 509-531). The genus is divided into two subgenera, based on the presence or absence of large cornuti on the vesica. In turn, the subgenus *Milocera* (cornuti present) falls into five and

the subgenus *Meiocera*, whose members lack cornuti, into two monophyletic species groups. Marked variation exists between species groups in the form of the valvae and shape of uncus and aedeagus. Uncus either broadly triangular with truncated apex and a small, inwardly directed tip (e.g., *M. aurora*, *M. diffusata*), attenuated (*M. dubia*, *M. pyrinia*), or broadly triangular and terminating in beak-like tip (*M. divorsa*). Gnathos always prominently developed, cingulate, square, or fairly deeply emarginate and terminating in a long, tongue-like process. Costa of valve ranging in shape from slender, gently recurved and lacking process (*M. dubia*) to apically dilated and displaying ventral process (e.g., *M. aurora*, *M. diffusata*), or greatly extended ventrally (*M. divorsa*). With the exception of *M. pyrinia* the base of the costal arm shows some ornamentation. Sacculus more or less triangular, occasionally with a sclerotized plate which may be absent on one side. Saccus usually rather short but greatly developed in *M. pyrinia*. Aedeagus ranging in shape from elongated to short and massive, but always becoming much narrower anteriorly. Vesica either unarmed (*M. dubia*) or bearing one (*M. pyrinia*) or two pairs of large cornuti (*M. divorsa*, *M. aurora*). Octavals present, consisting of a simple, chitinized lip (e.g., *M. divorsa*, *M. aurora*) or being pincer-like (*M. dubia*) or acutely pointed (*M. pyrinia*).

**FEMALE GENITALIA** (Figs 753–764). The structure of the female genitalia (based on the study of 12 species) recalls the condition found in *Platypepla*. Papillae anales well developed and fairly pointed. Apophyses posteriores long and thin, a. anteriores stronger, reaching approximately half the length of former. Sterigma extensively developed. Operculum present or absent. Bursa copulatrix small and rounded; ductus practically reduced to antrum which may become very wide; corpus bursae rounded, entirely or nearly entirely spinose.

**DISTRIBUTION.** Afro-tropical region north of 21°S (Zimbabwe and southern Angola). Madagascar.

### Key to species-groups and species of uncertain group affinity

- 1 Ochreous species with brown suffusion on falcate fore wing; median and postmedian line on fore wing well developed. ♂ and ♀ genitalia unknown. Zaire ..... 26. *facula* Prout, p. 61
- Variously coloured species but if ochreous with falcate fore wings, then lines on fore wing indistinct (Figs 37–64). Widely distributed in study area, including Zaire ..... 2
- 2(1) Adults as in Figs 37–54. ♂ genitalia (Figs 509–524) with vesica bearing large cornuti; uncus triangular (Groups 1–5). ♀ genitalia, where known, as in Figs 753–760 (*Milocera* (*Milocera*)) ..... 3

- Adults as in Figs 55–64. ♂ genitalia (Figs 525–532) with vesica without or with small cornuti only; uncus attenuate (Groups 6–7). ♀ genitalia, where known, as in Figs 761–764 (*Milocera* (*Meiocera*))) ..... 7
- 3(2) Adult pale ochreous, with thin postmedian line (Fig. 37). ♂ genitalia (Fig. 509) with strongly developed uncus; valve with costa and sacculus very narrow; costa curved, pointed. Arrangement of cornuti on vesica as illustrated. ♀ genitalia (Fig. 753) with small bursa copulatrix, corpus bursae with longitudinal, sclerotized bands. One species, endemic to Madagascar ..... 1. *horaria*-group, p. 44
- Adult not as in Fig. 37. ♂ and ♀ genitalia variously developed, but not as in Figs 509, 753. African mainland ..... 4
- 4(3) Adults pale, with indistinct or reduced markings (Figs 38–40). ♂ genitalia (Figs 510–512) with short and stout uncus, greatly elongated saccus and a narrow costa that may become densely spinose. Aedeagus bearing a large and a small pair of straight cornuti. ♀ genitalia, where known, with small bursa copulatrix; antrum large, funnel-shaped (Fig. 754). Three species ..... 2. *eugompha*-group, p. 44
- Adult not as in Figs 38–40. ♂ and ♀ genitalia variously developed, but not as above ..... 4
- 5(4) ♂ genitalia (Figs 513–515) with attenuated uncus, terminating in beak-like process; octavals dagger-like, widely separated. ♀ genitalia, where known, with very stout bursa copulatrix (Fig. 755). Three species ..... 3. *pyrinia*-group, p. 46
- ♂ genitalia (Figs 516–531) with broad, triangular to trapezoidal uncus; octavals consisting of distally rounded, medially protruding or broadly w-shaped, sclerotized lip. ♀ genitalia, where known (Figs 756–764), not as above ..... 6
- 6(5) ♂ genitalia (Figs 516–521) with a semicircular plate with serrated margin connecting base of costa and sacculus; the latter triangular and pointed, its distal margin exhibiting a well developed, triangular sclerotized plate. ♀ genitalia variable, as in Figs 756–760. Adults as in Figs 44–51 (6 species) ..... *diffusata*-group, p. 48
- ♂ genitalia (Figs 522–524) with broadly triangular, sometimes asymmetrical sacculus; semicircular plate on base of costa and triangular plate on sacculus absent. ♀ genitalia unknown. Adults as in Figs 52–54 (3 species) ..... *ustata*-group, p. 52
- 7(2) ♂ genitalia (Figs 530–532) with a group of very long spines arising from base of costa; remainder of costa naked or setose. ♀ genitalia, where known, as in Figs 763, 764 (♂ of *M. aureolitoralis* unknown). Adults as in Figs 61–64 (4 species) ..... *dubia*-group, p. 58
- ♂ genitalia (Figs 525–529) with spines confined to apex or outer margin of costa. ♀ genitalia, where known, as in Figs 761, 762. Adults as in Figs 55–60 (5 species) ..... *arcifera*-group, p. 54

## Subgenus *Milocera* Swinhoe, 1904

Type species: *Milocera horaria* Swinhoe, 1904: 522, by original monotypy.

**DIAGNOSIS.** The synapomorphies uniting members of this subgenus are (i) the presence of large cornuti on the vesica (frequently these occur in two (Fig. 516) or three pairs (Fig. 513) and (ii) the extremely short and wide ductus bursae in the female genitalia.

**DESCRIPTION.** Small to large species of ochreous, yellowish or brown coloration. Apex of fore wing only weakly falcate. Tip of abdomen of male of some species with hair-pencils (e.g., Fig. 514).

**MALE GENITALIA.** Uncus in most species broadly triangular; if attenuated, it is fairly short. Gnathos prominent. Valvae with costa narrow (e.g., Fig. 516) or spatulate (Fig. 513); in *M. horaria* straight and narrow and terminating in hook (Fig. 509). Sacculus triangular and short (Fig. 510) to long (Fig. 514), in some species exhibiting a triangular sclerotized plate (Fig. 518). Saccus small to large. Aedeagus elongated and cylindrical (Fig. 510) to short and stout (Fig. 513); vesica bearing prominent cornuti. Octavals present and shallow with rounded tips (Fig. 517), entire, lacking median cleft (Fig. 523) or ribbed and dagger-like (Fig. 515).

**FEMALE GENITALIA.** Papillae anales well developed, somewhat pointed. Apophyses slender. Sterigma large. Operculum present (Fig. 760) or absent. Ductus bursae short and very wide, often equalling or surpassing corpus bursae in length. Corpus small and rounded, partly (Fig. 757) or entirely spinose (Fig. 759).

### 1. *Milocera horaria*-group

The sole representative is the type species of the genus, *horaria* Swinhoe, from Madagascar. It is also the only species of *Milocera* known from that island. The autapomorphies defining the group are the narrow, apically hooked costa of the valve and the aedeagus, which terminates in a long hook, arising from a bulbous base.

#### 1. *Milocera horaria* Swinhoe, 1904

Figs 37; 509, 753

*Milocera horaria* Swinhoe, 1904: 522. LECTOTYPE ♂, here designated, **Madagascar**: Type; Madagascar 82.26 [Cowan]; *Milocera horaria* Swinhoe type (BMNH) [examined]. Paralectotype (1♂). **Madagascar**: same data as holotype (BMNH) [not examined].

*Milocera horaria* Swinhoe; Herbule, 1956: 249.

FORE WING LENGTH. 11–12 mm (♂), 13–14 mm (♀).

ADULT (Fig. 37). A medium-sized *Milocera*. Fore

wings falcate but apex well rounded. Ground colour of wings pale ochreous, densely irrorated and striated with dark brown; tips of fore wing suffused with dark brown; suffusion weaker in ♀. Postmedian area of fore wing, particularly of ♂, with a circular greyish spot. Fore wing with convex, zigzagging basal and slightly curved postmedian; both lines dark brown, fine. Hind wing with postmedian line only. Discal spots present but inconspicuous, hardly discernible in some specimens. Underside similar but with coarser irroration and darker markings. Ciliae along termen of wings chequered, ochreous and dark brown. Vestiture of thorax and abdomen concolorous with wings, pale ochreous mixed with darker scales. Hind tibia of ♂ dilated, bearing hair-pencil. Scale patch on A3 present.

**MALE GENITALIA** (Fig. 509). Uncus large, with bluntly rounded tip; gnathos prominent but not strongly sclerotized. Costa of valve narrow, its apex curved approximately at right angles; an appendage with serrated or dentate distal margin extending to about half length of costa. Sacculus narrowly triangular, about length of costa. Saccus terminating in short, stout tip. Aedeagus with broad apical half, strongly tapering anteriorly; vesica with one very large cornutus, arising from bulbous base, grouped around which are four smaller, needle-like cornuti. Octavals in shape of a weakly concave, sclerotized lip.

**FEMALE GENITALIA** (Fig. 753). Papillae anales large. Apophyses rather strong; a. anteriores long, reaching three-fourths length of a. posteriores. Sterigma with large but weakly sclerotized l. antevaginalis. Bursa copulatrix small; ductus bursae short, widest near osium. Corpus bursae small, bursa wall with several sclerotized bands.

**DIAGNOSIS.** Superficially similar to *M. eugompha* and *M. ustatooides*, below. However, *M. horaria* is the only species to occur in Madagascar; the genitalia of both sexes show considerable differences to those of the other species.

**BIOLOGY.** Adults have been collected October–December.

**DISTRIBUTION.** Madagascar, recorded from eastern and south-eastern parts.

**MATERIAL.** 2♂ (1 dissected, Geometridae genitalia slide No. 17523) (BMNH) and 4♀ (1 dissected, Geometridae genitalia slide No. 17524) (BMNH). 6 London (BMNH).

**LOCALITIES.** **Madagascar**: Périer Station (5); Forêt d'Isaka nr. Fort Dauphin (1).

### 2. *Milocera eugompha*-group

This group contains three representatives. The monophyly of the group rests on two apomorphies

provided by the male genitalia: (i) a narrow, recurved costa with long spines along the entire inner margin, and (ii) the presence of a single large, sword-like cornutus, accompanied by two or three much smaller, needle-like cornuti.

## Key to species

- 1 Very small species (fw length 9 mm) (Fig. 40). ♂ genitalia with base of costa hunched (Fig. 512). ♀ unknown. Ivory Coast .....  
..... 4. *depauperata* sp. n., p. 46
- Larger species (fw length 12–15 mm) (Figs 38, 39). ♂ genitalia (Fig. 510, 511) with base of costa not hunched. ♀ genitalia, where known, as in Fig. 754. Not recorded from Ivory Coast ..... 2
- 2(1) Smaller moths (fw length 12–13 mm) with indistinct postmedian line (Fig. 38). ♂ genitalia (Fig. 510) with costa long and densely spinose. ♀ genitalia as in Fig. 754. Rwanda and Tanzania .....  
..... 2. *eugompha* sp. n., p. 45
- Larger moths (fw length 15 mm) with totally reduced lines (Fig. 39). ♂ genitalia (Fig. 511) with costa setose but not bearing stiff spines. ♀ unknown. Kenya ..... 3. *podocarpi* Prout, p. 45

### 2. *Milocera eugompha* sp. n.

Figs 38; 510, 754

**TYPE MATERIAL.** Holotype ♂, **Rwanda:** S.W., Nyungwe Forest, Route Delvaux km 3, 2200 m, 19.XII.1976 (B. Turlin); Pr[éparation] No. 6958 C. Herbolut (C. Herbolut collection). Paratypes (1♂, 2♀). **Rwanda:** 1♂, *ibidem*, at km 17, dated 7.V.1975 (B. Turlin). **[Tanzania]:** 1♀, Mal[aria] Inst[itute] Amani, 4/[19]64, P.000/P.000; G. Pringle Coll. B.M.1966–281; Geometridae genitalia slide No. 17531 (BMNH). 1♀, *ibidem*, dated 12/[19]62. (BMNH, C. Herbolut collection).

**FORE WING LENGTH.** 12–13 mm (both sexes).

**ADULT** (Fig. 38). A medium-sized *Milocera*. Fore wings only faintly falcate. Ground colour of wings ochreous, paler in ♀, and densely irrorated with brownish grey, more densely so near bases. Costa of fore wing with a basal and a subapical dark brown macula. Postmedian line on both wings faint, greyish; other lines absent. Discal spots present on both wings but not conspicuous. Underside similar but ground colour more intense, irroration darker and markings heavier. Vestiture of thorax and abdomen concolorous with wings, pale ochreous in ♀ and darker ochreous in ♂. Hind tibia of ♂ dilated, bearing hair-pencil. Scale patch on A3 not detectable on preparation of ♂ holotype.

**MALE GENITALIA** (Fig. 510). Uncus rather short,

from broad base; gnathos strongly developed. Costa of valve slender and recurved; inner margin covered with long spines for most of its length. Sacculus small, triangular. Saccus prominent, extended into a long tip. Aedeagus large relative to size of genitalia; vesica bearing a single, very large sword-like cornutus and two smaller, needle-like cornuti in apical position. Octavals w-shaped with rounded tips; weakly chitinized. No hair-pencils on distal margin of A8.

**FEMALE GENITALIA** (Fig. 754). Small and delicate. Papillae anales normally developed; apophyses strong. Sterigma not modified. Bursa copulatrix consisting of large, funnel-shaped ductus and small, completely spinose corpus bursae. Spines covering bursa wall very long.

**DIAGNOSIS.** This is a very pale *Milocera* species that superficially resembles only *M. horaria*, above. The latter, however, possesses a zigzagging basal line on the fore wing (absent in *eugompha*), has more strongly falcate fore wings, and is endemic to Madagascar, whereas *M. eugompha* occurs in East Africa.

**BIOLOGY.** The species is associated with forest. In its Rwandan locality, *M. eugompha* occurs at altitudes above 2000 m. Adults have been collected between April and May and in December.

**DISTRIBUTION.** Recorded from Rwanda and Tanzania.

**ETYMOLOGY.** From Greek εὐ, well, and γόμφος, ὁ, being studded with nails, referring to the long spines which cover the wall of the bursa copulatrix.

### 3. *Milocera podocarpi* Prout, 1932

Fig. 39; 511

*Milocera podocarpi* Prout, 1932a: 496. Holotype ♂, **[Kenya]:** Type; Afrique or [ientale] anglaise, Mt. Kenya vers[an]t Ouest, zone des forêts (Alluaud & Jeannel); Forêts infér[ieu]res (*Podocarpus*) 2400 m, St. 39, Jan[vier]–Fév[rier] 1912; *Milocera podocarpi* Prout ♂ type; *Milocera podocarpi* Prout, *Mém. Soc. Zool. Fr.*, 1932, 29, p. 000; genitalia slide M. Krüger No. 33 (MNHN) [examined].

**FORE WING LENGTH.** 13–15 mm (♂).

**ADULT ♂** (Fig. 39). Large. Antennae ciliate, with cilia about 1.5 times diameter of shaft. Costa of fore wing arched; termen not or hardly falcate. Ground colour of wings cream, suffused with ochreous, but less densely so in basal and median area of hind wing. Somewhat indistinct and uneven greyish striation present on both wings. Discal spots grey, faint. Lines reduced. Underside: orange-ochre with intense, coarse, greyish-brown

irroration. Discal spots darker than on upperside. Basal and median line absent, postmedian present as a series of fairly large dark maculae. Vestiture of thorax and abdomen concolorous with wings, ochreous, mixed with numerous dark scales on underside. Hindtibia lost in holotype. Setal patch on A3 present.

**MALE GENITALIA** (Fig. 511). Uncus triangular, terminating in curved, beak-like tip. Gnathos well developed but weakly chitinized; arms and medial element broad. Costa of valve narrow, hardly widening towards apex and exhibiting a long, sclerotized ventral plate along basal two-thirds. Sacculus well separated, stout and triangular and showing little sclerotization. Saccus produced into a long tip. Aedeagus stout, near-cylindrical. Vesica with a large, grooved inner cornutus, flanked by several smaller needle-like cornuti. Octavals broadly w-shaped and weakly sclerotized.

**DIAGNOSIS.** The large size and reduction on both wings of the postmedian line are characteristic. 17. *M. arcifera* is similar in size and coloration, but has the postmedian line always well developed. In the ♂ genitalia, the cornuti are smaller than in similar species.

**BIOLOGY.** The species is associated with afromontane *Podocarpus* forest at an altitude of 2400 m. Adults are active January–February and in July.

**DISTRIBUTION.** Kenya.

**MATERIAL.** 1 ♂, **Kenya:** Thomson's Falls. 1 Nairobi (NMKE).

#### 4. *Milocera depauperata* sp. n.

Figs 40; 512

**TYPE MATERIAL.** Holotype ♂, **Ivory Coast:** Bingerville, June 9–12 1915 (G. Melou); Rothschild Bequest B.M. 1939–1; Geometridae genitalia slide No. 17741 (BMNH).

**FORE WING LENGTH.** 9 mm (holotype).

**ADULT ♂** (Fig. 40). Very small. Termen of fore wing slightly convex. Ground colour of wings yellowish-ochre, finely striated with grey. Discal spots blackish, minute. Lines absent except for traces of postmedian on both wings. Underside similar, but dark irroration and striation more prominent; postmedian line darker but still incomplete. Vestiture of thorax and abdomen concolorous with wings, ochreous mixed with brownish-grey scales. Hind tibia of ♂ not modified. Setal patch on A3 present.

**MALE GENITALIA** (Fig. 512). Uncus narrowly triangular, arising from broad base; gnathos rectangular. Costa of valve slender, curved and slightly dilated

apically; a short, rounded process present near base. Sacculus small, triangular. Saccus prominent, extended to form long tip. Aedeagus short and spindle-shaped; vesica with one large, bladelike pair of cornuti with serrated margin and a second, smaller, needle-like pair of apically cleft cornuti. Octavals weakly sclerotized, w-shaped with rounded tips.

**DIAGNOSIS.** Similar to 11. *M. ja* and its close relatives, below, but smaller and apparently with even more reduced markings. In the ♂ genitalia, the shape of the valves and the strongly developed saccus are characteristic.

**BIOLOGY.** Probably associated with lowland forest. Adults are active in June.

**DISTRIBUTION.** Ivory Coast.

**ETYMOLOGY.** From Latin *depauperatus* (-a, -um), impoverished: on account of the almost total reduction of wing markings.

#### 3. *Milocera pyrinia*-group

This group comprises three rather small species with rounded fore wings. They share the following apomorphies: male genitalia with beak-shaped uncus, short and spatulate costa, very short and stout aedeagus with two or six short, curved, and heavily sclerotized cornuti, and widely separated, grooved octavals. The female genitalia are known only for *M. sexcornuta*. Distribution of the groups extends from West to East Africa.

#### Key to species

- 1 Yellowish moths with fine postmedian line (Fig. 43). ♂ genitalia (Fig. 515) with two cornuti on vesica. ♀ unknown. Zaire, Zambia ..... 7. *pyrinia* Prout, p. 48
- Brown moths with fine postmedian line (Figs 41, 42). ♂ genitalia (Figs 513, 514) with six cornuti on vesica. ♀ genitalia, where known, as in Fig. 755 . 2
- 2(1) ♂ genitalia (Fig. 514) with slender costa and very short octavals. ♀ unknown. Kenya ..... 6. *herbuloti* sp. n., p. 47
- ♂ genitalia (Fig. 513) with costa wider than above and markedly longer octavals. ♀ genitalia (Fig. 755) with very stout bursa copulatrix. Rwanda, Uganda; Cameroon ..... 5. *sexcornuta* sp. n., p. 46

#### 5. *Milocera sexcornuta* sp. n.

Figs 41; 513, 755

**TYPE MATERIAL.** Holotype ♂, **Rwanda:** Centre-Sud, Karama Bugesera (Savane arborée), 1400

m, 27.XII.1975 (B. Turlin); genitalia slide Hrblt. No. 18 (C. Herbolut collection). Paratypes (3♂, 2♀). **Rwanda:** 1♀, same data as holotype; genitalia slide Hrblt. No. 19. 1♂, SW., Forêt Nyungwé, 2000 m, 8.III.1975 (B. Turlin). **Uganda:** 1♂, Mafuga Rain For[est], Kigezi, 7500–8000 [ft.], June 1951 (T.H.E. Jackson); Geometridae genitalia slide No. 17528 (BMNH); 1♀, Kigezi, Impenetrable For[est], Mar[ch] 1967 (R.C. Otieno). **Cameroon:** 1♂, Forêt de Bafout Nguemba, 8 km SSE. de Bamenda, 2000 m, 4. et 5.IV.1970 (C. Herbolut et C. Lemaire); pas en B.M. mais voir *-falcula*, *-podocarpi*; genitalia slide Hrblt. No. 21; 1♀, Nkolbisson, 700 m, 15. au 18.IV.1972 (C. Herbolut). (BMNH, C. Herbolut collection).

FORE WING LENGTH. 11 mm (♂), 11–12 mm (♀).

**ADULT** (Fig. 41). A small and delicate *Milocera*. Costa of fore wing strongly convex; termen of fore wing almost straight. Wings faintly glossy, male dark purplish brown, female lighter, ochreous-brown, with some darker brown suffusion on apex of fore wing. Both sexes with darker brown irroration. Fore wing with convex basal and oblique postmedian, hind wing with postmedian line only; all lines dark brown, quite thin. Discal spots present on both wings, inconspicuous. Underside similar in both sexes, ochreous with an orange tinge and with intense brown striation. Discal spots and postmedian line present, heavier and less well defined than on upperside. Vestiture of thorax and abdomen concolorous with wings, brown on upper- and ochreous on underside. Hind tibia of ♂ scarcely dilated, grooved, the groove containing a tuft of fine hairs. Scale patch on A3 well developed.

**MALE GENITALIA** (Fig. 513). Uncus attenuated, beak-shaped; gnathos prominent, band-like. Costa of valve from broad base, strongly tapering towards apex; sacculus small and somewhat triangular, gently recurved. Saccus massive, terminating in broadly rounded tip. Aedeagus short and very stout, fusiform; vesica bearing six curved, heavily sclerotized, blade-like cornuti. Octavals dagger-like, widely separated.

**FEMALE GENITALIA** (Fig. 755). Papillae anales small. Apophyses normally developed. Sterigma forming a convoluted bulge around ostium. Bursa copulatrix massive, with short and wide-mouthed ductus bursae and rounded, partly spinose corpus bursae.

**DIAGNOSIS.** *Milocera sexcornuta* resembles the two other species in this group, 6. *M. herbuloti* and 7. *M. pyrinia*, although the latter is separated from it by its golden-yellow ground colour. From *Milocera herbuloti* it cannot be distinguished without dissection of the genitalia. The differentiating features are described under the following species. Both species appear to be allopatric, with *M. sexcornuta* having been collected in

Rwanda, Uganda and Cameroon and *herbuloti* being recorded from Tanzania and Kenya.

**BIOLOGY.** The species has been collected in (rain) forest as well as tree savanna habitats at altitudes between 700 and 2600 m. Adults are active in December, March–April, and June.

**DISTRIBUTION.** Recorded from East (Rwanda, Uganda) and West Africa (Cameroon).

**ETYMOLOGY.** From Latin *sex*, six, and *cornus* (-*us*), a horn; the aedeagus exhibits six large, horn-like cornuti.

## 6. *Milocera herbuloti* sp. n.

Figs 42; 514

**TYPE MATERIAL.** Holotype ♂, **Kenya:** Isiolo, 2.–15.III.[19]69 (Watulege); genitalia slide Hrblt. No. 20 (C. Herbolut collection). Paratypes (9♂). **Kenya:** 1♂, same data as holotype, with additional label: pas en B.M. mais voir *-falcula*, *-podocarpi*; 1♂, Mt. Elgon, Sept[ember] 1951 (T.H.E. Jackson); 1♂, Nairobi, Mar[ch] [19]58 (R. Carcasson); 1♂, *ibidem*, Nov[ember] [19]65 (R.H. Carcasson); 1♂, *ibidem*, Nov[ember] [19]67 (F. Carcasson); 1♂, Kitale, Dec[ember] 1961 (Mrs. E.M. Dougall); 2♂, Karura Forest, Feb[ruary] 1969 (M.P. Clifton). **[Tanzania]:** 1♂, Mukuyu, Eigoma, T[anganyika] T[erritory], Oct[ober] 1962, Japanese Primate Exped[ition]. (NMKE, C. Herbolut collection).

FORE WING LENGTH. 10–12 mm (♂).

**ADULT ♂** (Fig. 42). Externally, both sexes are indistinguishable from *M. sexcornuta*, above. For a description, see under that species. Hind tibia of ♂ grooved, containing some very fine, yellowish hairs. Scale patch on A3 well developed.

**MALE GENITALIA** (Fig. 514). Uncus relatively weak; gnathos well developed, with tongue-shaped centre. Costa of valve rather narrow, broad near base, then tapering strongly. Apex and termen of costa bearing short, curved spines. Sacculus truncated. Saccus large. Aedeagus massive, spindle-shaped, vesica with six heavily sclerotized cornuti; inner two pairs small and straight, outer pair much larger, curved. Octavals dagger-like, short, widely separated. A pair of hair-pencils present on distal margin of A8.

**DIAGNOSIS.** In facies, the species closely resembles *M. sexcornuta*, above, though the male appears to be lighter brown. In the male genitalia, *M. herbuloti* can be separated from *M. sexcornuta* as follows: uncus smaller; gnathos more compact, with tongue-shaped centre; aedeagus less broad; octavals shorter; and hair-pencils present on distal margin of A8.

BIOLOGY. Adults have been collected in February–March and from October to December.

DISTRIBUTION. Kenya and Tanzania.

ETYMOLOGY. I have pleasure in naming this species after the well-known French geometrid specialist Claude Herbulot who most obligingly put his collection at my disposal.

## 7. *Milocera pyrinia* Prout, 1934

Figs 43; 515

*Milocera pyrinia* Prout, 1934b: 94. Type material: Holotype ♂, [Zaire]: Type; Musée du Congo, Katanga: Elisabethville, 2.XII.1933 (Ch. Seydel); R. Dét. R 2804; *Milocera pyrinia* Prout ♂ type; Tervuren Museum ♂ Genitalia slide No. GE. 146 (MRAC) [examined].

FORE WING LENGTH. 11–12 mm (♂).

ADULT ♂ (Fig. 43). A medium-sized *Milocera*. Fore wings scarcely falcate, termen nearly straight. Ground colour vividly orange-yellow, striated with light grey, and suffused with brown along termen of both wings. Fore wing with very faint, convex basal and thin, somewhat concave postmedian line; hind wing with postmedian only. Discal spots minute or absent. Underside orange with intense, even brownish-grey striation; postmedian line and discal spots scarcely shining through. Vestiture of thorax and abdomen concolorous with wings. Hind tibia of ♂ not modified. Scale patch on A3 present.

MALE GENITALIA (Fig. 515). Uncus attenuated, slightly curved. Gnathos well developed. Costa of valve rhomboid, short; sacculus triangular, shorter than costa, with rounded apex. Saccus very large. Aedeagus massive, tapering strongly anteriorly; vesica bearing two very large, tooth-like cornuti. Octavals dagger-like, widely separated.

DIAGNOSIS. The orange-yellow coloration renders this species unmistakable.

BIOLOGY. Adults have been collected January–March, in May, and in August and October.

DISTRIBUTION. Zambia and Zaire.

MATERIAL. 7 ♂ (2 dissected, NMBZ genitalia slide L 694; Geometridae genitalia slide No. 2581) (BMNH). 3 London (BMNH), 1 Bulawayo (NMBZ), 3 Nairobi (NMKE).

LOCALITIES. [Zambia]: N. Rhodesia, Abercorn (3); Mbala near Abercorn (2). [Zaire]: Belgian Congo, Elisabethville (2).

## 4. *Milocera diffusata*-group

This is a small group of six small to medium-sized ochreous or brown species with a fairly wide distribution in West and East Africa. Structurally the *diffusata*-group approaches the following group closely (see introduction to *M. ustata*-group, below). The group is defined by two autapomorphies derived from the male genitalia, (i) the condition of the sacculus, which is triangular and rather pointed and carries a finely serrated triangular plate, and (ii) the presence of a somewhat semicircular plate with finely serrated margin that connects the base of the costa with the sacculus.

### Key to species

- 1 Yellowish moths with brown suffusion confined to postmedian area of fore wing (Fig. 51). ♂ genitalia (Fig. 521) with short, crooked aedeagus. ♀ genitalia (Fig. 760) with small bursa copulatrix and very wide antrum. Zimbabwe, Malawi, Angola, Zaire, Tanzania, Kenya ..... 13. *aurora* sp. n., p. 51
- Moths ochreous, lacking brown suffusion (Fig. 44) or reddish-brown (Figs 45–50). ♂ and ♀ genitalia not as above. Distribution partly overlapping ..... 2
- 2(1) Fairly large, ochreous *Milocera* (fw length 12–13 mm) with falcate fore wings (Fig. 44). ♂ genitalia (Fig. 516): costa of valve not distended near base; sclerotized plate on sacculus small. ♀ genitalia (Fig. 756) with small bursa copulatrix; antrum subcylindrical, well sclerotized. Uganda, Tanzania ..... 8. *ustatoides* sp. n., p. 49
- Smaller, reddish-brown moths with weakly falcate fore wings (Figs 45–50). ♂ and ♀ genitalia not as above. Not recorded from Tanzania ..... 3
- 3(2) Very small moths (fw length 9–11 mm) (Figs 48, 49). ♂ genitalia (Fig. 519) delicate. ♀ genitalia (Fig. 758) with somewhat angular bursa copulatrix, bursa wall with conspicuous longitudinal ridges. Cameroon ..... 11. *ja* sp. n., p. 50
- Mostly larger moths (fw length 10–12 mm) (Figs 45–47; 50). ♂ genitalia (Figs 517, 518, 520) more robust. ♀ genitalia, where known (Figs 757, 759), without longitudinal ridges on bursa wall. Widely distributed, including Cameroon (one species) .... 4
- 4(3) Adults (Fig. 50) with well defined postmedian line. ♂ genitalia (Fig. 520): uncus broad, with pointed tip; a pair of hair-pencils present on distal margin of A8. ♀ genitalia (Fig. 759) as illustrated, with large, rounded corpus bursae. Cameroon, Angola ..... 12. *scoblei* sp. n., p. 51
- Adults (Figs 45–47) with poorly defined or absent postmedian line. ♂ genitalia (Figs 517, 518) with uncus narrower; distal margin of A8 without hair-pencils. ♀ genitalia, where known, with much smaller ductus bursae (Fig. 757). Cameroon, Zaire; Uganda ..... 5

- 5(4) Adults as in Figs 45, 46. ♂ genitalia (Fig. 517) with tip of uncus beak-shaped; tip of process on costa acutely pointed. Octavals hardly emarginate. ♀ genitalia (Fig. 757) as illustrated, with small, somewhat elliptical corpus bursae. Cameroon, Zaire, Uganda, Kenya ..... 9. *diffusata* (Warren), p. 49
- Adults as in Fig. 47. ♂ genitalia (Fig. 518) with tip of uncus truncated; tip of process on costa rounded. Octavals broadly w-shaped. ♀ unknown. East Africa (Uganda) ..... 10. *zika* sp. n., p. 50

### 8. *Milocera ustataoides* sp. n.

Figs 44; 516, 756

**TYPE MATERIAL.** Holotype ♂, **Tanzania:** Africa, Tanzania, E. slope of Mt. Meru, forestry, 5700 ft., 21.I.-1.II.1966, leg[it] Dr. J. Szunyoghy; *Milocera* sp. det. D.S. Fletcher, 1975 (BMNH). Paratypes (1♂, 7♀). **Tanzania:** 1♂, 4♀, Mal[aria] Inst[itute] Amani, P979/P979; G. Pringle Coll., B.M. 1966-281, dated Nov[ember] (♂, dissected, Geometridae genitalia slide No. 17536) (BMNH); 3/[19]62 (♀); 4/[19]62 (2♀); Jan[uary] (♀); Feb[ruary] (♀, dissected, Geometridae genitalia slide No. 17537) (BMNH). **Uganda:** 1♀, Kitale Forest, Toro, May 1966 (R.H. Carcasson); 1♀, Katera Sango Bay, Masaka, Oct[ober] 1960 (R.H. Carcasson). (BMNH, NMKE).

**FORE WING LENGTH.** 12-13 mm (both sexes).

**ADULT** (Fig. 44). A rather large *Milocera*. Fore wings falcate, acutely pointed. Ground colour of wings ochreous, more or less densely sprinkled and striated with grey. Apical region of fore wing with a large, dirtyish grey blotch. Lines indistinct; basal and postmedian on fore-, and postmedian on hind wing present as rather indistinct fasciae, though very faint in some specimens. Discal spots grey, small on fore wing, larger on hind wing. Underside similar but ground colour more vivid, and with markings and dark irroration much darker; apical blotch on fore wing pale grey. Thorax and abdomen concolorous with wings, ochreous mixed with grey scales. Hind tibiae of ♂ somewhat dilated, but apparently without hair pencils or hair-lined groove. Scale patch on A3 present.

**MALE GENITALIA** (Fig. 516). Uncus broadly triangular, with truncated apex. Gnathos well developed. Costa of valve narrow, of equal width throughout, with a kink beyond middle. Sacculus prominent, triangular, with a small, sclerotized triangular plate near apex. A roundish, sclerotized plate with serrated outer margin present near common base of costa and sacculus. Aedeagus strongly chitinized, tapering anteriorly; vesica with one curved and one straight pair of heavily sclerotized cornuti. Octavals proper absent; distal margin of A8 gently indented, somewhat sclerotized and bearing a fringe of long hairs.

**FEMALE GENITALIA** (Fig. 756). Papillae anales large. Apophyses normally developed. Sterigma as in figure. Bursa copulatrix small and very compact. Ductus bursae well sclerotized, smooth, of equal width throughout. Corpus bursae rounded, shorter than ductus, its wall thinly spinose.

**DIAGNOSIS.** The species resembles 15. *M. ustata*, below, rather closely but can at once be recognized by its acutely pointed fore wings (rounded in *ustata*). The male genitalia are very different (compare Figs 516 and 523).

**BIOLOGY.** Probably associated with mountainous forest. The holotype was collected at an altitude of 1900 m. Adults are active January-May and in November-December.

**DISTRIBUTION.** Tanzania and Uganda.

**ETYMOLOGY.** From *Milocera ustata* and Greek ειδος, τό, form, appearance; the moths resemble each other in habitus.

### 9. *Milocera diffusata* (Warren, 1902) comb. n.

Figs 45, 46; 517, 757

*Azata diffusata* Warren, 1902: 528. Holotype ♂, [Zaire]; Yakasu, U[pper] Congo (K. Smith)/May [19]00; IX.528/*Azata diffusata* Warr. type ♂; Type; Rothschild Bequest B.M. 1939-1; Geometridae genitalia slide No. 17746 (BMNH) [examined].

**FORE WING LENGTH.** 10 mm (♂), 11 mm (♀).

**ADULT** (Figs 45, 46). Small. Termen of fore wing practically straight. Ground colour of wings yellowish, suffused with reddish brown in males and ochreous brown in females, and with dense brownish-grey striations. Apex of fore wing with some faint purplish suffusion. Lines reduced except for ill-defined, greyish postmedian fascia. Discal spots moderately well developed to faint, larger on hind wing. Underside orange brown with intense, coarse suffusion and striation. Postmedian fascia darker than on upperside. Vestiture of thorax and abdomen ochreous-brown to brown, concolorous with wings. Hind tibia of ♂ slightly swollen but not bearing hair-pencil. Scale patch on A3 present.

**MALE GENITALIA** (Fig. 517). Uncus beak-shaped, stout, densely setose. Gnathos tongue-shaped. Costa of valve very slightly dilated apically; basal half bearing angular ventral process of about twice width of remainder of costa. Apex of process forming a short, acute tip. An approximately semicircular plate with serrated margin present near base of costa. Sacculus triangular, bearing a triangular sclerotized plate. Saccus rounded,

not protruding far from valvae. Aedeagus fairly slender, club-shaped; vesica with a large, curved inner pair and a second, much smaller outer pair of cornuti. Octavals hardly emarginate, weakly sclerotized.

**FEMALE GENITALIA** (Fig. 757). Papillae anales normal; both pairs of apophyses thin. Sterigma: l. antevaginalis broadly crescent-shaped; l. postvaginalis as in figure. Bursa copulatrix with long and wide ductus, slightly constricted near middle, and small and rounded corpus. Bursa wall opaque, apparently not truly spinose but with a belt of small, narrowly elliptical sclerotizations at base of ductus; these may have been derived from denticles.

**DIAGNOSIS.** Very similar to *M. zika*, *ja* and *obfuscata*, below. Males of *obfuscata* may be recognized by the presence of a well developed hair pencil on the hind tibia. In genitalia structure, *M. diffusata* is closely similar only to *zika*, from which species it may be separated by the more angular ventral process of the costa which terminates in a short process (rounded in *zika*), and the relatively shorter sacculus. Also similar are 5. *M. sexcornuta* and 6. *M. herbuloti*, above, and 12. *M. scoblei*, below. However, all of these species have a clearly defined postmedian line on both wings.

**BIOLOGY.** *M. diffusata* is probably associated with tropical lowland forest. Adults have been collected in May and October. In Cameroon the species has been collected at altitudes around 650 m (2000 ft).

**DISTRIBUTION.** West to East Africa, recorded from Cameroon, Zaire, Uganda and Kenya.

**MATERIAL.** 5♂ (2 dissected, Geometridae genitalia slide No. 17745 (BMNH) and NMKE genitalia slide No. 67) and 1♀ (dissected, BMNH genitalia slide No. 17535) (BMNH). 4 London (BMNH), 2 Nairobi (NMKE).

**LOCALITIES.** **Cameroon:** Bitje, Ja River (3). **[Zaire]:** Upper Congo, Bopoto (1). **Kenya:** Kakamega (1). **Uganda:** Entebbe (1).

## 10. *Milocera zika* sp. n.

Figs 47; 518

**TYPE MATERIAL.** Holotype ♂, **Uganda:** Kampala, 23.I.1955 (D.G. Sevastopolio), B.M. 1955.349; 23 (BMNH). Paratypes (5♂). **Uganda:** 3♂, Entebbe, Zika Forest, VI.1961, Nat[ional] Mus[eum] S[outh] R[hodesia] (1 dissected, NMBZ genitalia slide L 692); 2♂, Entebbe, Nat[ional] Mus[eum] S[outh] R[hodesia]. (NMBZ).

**FORE WING LENGTH.** 11–12 mm (♂).

**ADULT ♂** (Fig. 47). Extremely similar to *M. diffusata*,

above, but apparently with somewhat more intense purplish-grey suffusion on apex of fore wing. Hind tibia of ♂ not dilated and not bearing hair-pencil. Scale patch on A3 present.

**MALE GENITALIA** (Fig. 518). Uncus trapezoidal, with small sclerotized process below apex. Gnathos very large, terminating in long, tongue-shaped extension. Costa of valve straight, slightly dilated apically, and with a broad, blunt ventral process near connection with sacculus. The latter triangular, rather pointed and exhibiting a large triangular plate. Aedeagus slender, tapering anteriorly; vesica with one pair of large and curved inner cornuti and a second, smaller pair of straight cornuti. Octavals weakly chitinized, broadly w-shaped.

**DIAGNOSIS.** In facies almost identical to *M. diffusata*, above, but apparently with more extensive purplish-grey suffusion on fore wing apex. The male genitalia are also close, but in *zika* the ventral process of the costa is more rounded and the sacculus somewhat longer. It should also be noted that the two species are allopatric.

**BIOLOGY.** The species appears to be associated with forests; adults have been collected in January and June.

**DISTRIBUTION.** Uganda.

**ETYMOLOGY.** Named after one of the type localities.

## 11. *Milocera ja* sp. n.

Figs 48, 49; 519, 758

**TYPE MATERIAL.** Holotype ♂, **[Cameroon]:** 19.20. Bitje, Ja River, Oct[ober], Wet Season (G.L. Bates); Joicey Bequest Brit. Mus. 1934–120.; Geometridae genitalia slide No. 17744 (BMNH). Paratype (1♀). **[Cameroon]:** same data as holotype; Joicey Bequest Brit. Mus. 1934–120.; Geometridae genitalia slide No. 17742 (BMNH).

**FORE WING LENGTH.** 9 mm (♂), 11 mm (♀).

**ADULT** (Figs 48, 49). Very small. Termen of fore wing straight. Ground colour of wings ochreous, suffused with brown in ♂, and with dense, pale grey striations in both sexes. Lines reduced except for poorly defined postmedian fascia. Discal spots present but not conspicuous. Underside similar but ground colour and striation much more intense; postmedian fascia notably of ♀ prominent. Vestiture of thorax and abdomen concolorous with wings. Hind tibia of ♂ hardly dilated, bearing hair-pencil hidden in groove. Scale patch on A3 present.

**MALE GENITALIA** (Fig. 519). Uncus triangular with truncated apex, ending in small, inwardly directed tip;

surface densely setose. Gnathos prominent, tongue-shaped. Costa of valve slender, weakly curved and somewhat dilated apically. Basal half exhibiting angular, not particularly sclerotized process. Sacculus triangular, sclerotized plate very small. Saccus rounded, hardly protruding beneath valvae. Aedeagus club-shaped; vesica with a larger, curved inner and a smaller, straight outer pair of cornuti. Octavals weakly sclerotized, hardly emarginate. Distal margin of A8 bearing hair pencils.

**FEMALE GENITALIA** (Fig. 758). Papillae anales relatively narrow. Both pairs of apophyses thin; a. anteriores approximately two-thirds length of a. posteriores. Sterigma unevenly crescentic. Ductus bursae short and wide, posterior margin undulating. Corpus bursae small and somewhat angular, wall with prominent longitudinal ribs, bearing long spicula.

**DIAGNOSIS.** The species resembles most members of the -group, and dissection of the genitalia is necessary for reliable identification. The male genitalia are close to *M. diffusata* and *M. zika*, above, but may be recognized by the strong reduction of the sclerotized plate on the sacculus. The genitalia of the female are characterized by the somewhat angular shape of the bursa copulatrix; similarly prominent longitudinal ribs are also present in the Madagascan *M. horaria* (Fig. 753).

**BIOLOGY.** Probably an inhabitant of tropical lowland forest. Adults have been collected in October.

**DISTRIBUTION.** Cameroon.

**ETYMOLOGY.** Named after the type locality.

## 12. *Milocera scoblei* sp. n.

Figs 50; 520, 759

**TYPE MATERIAL.** Holotype ♂, [Cameroon]: Cameroun, Mont Ngaékélé, 11 km WSW. de Yaoundé, 1125 m, 10.XI.1976 (Ph. Darge); genitalia slide Hrbtl. No. 17 (C. Herbule collection). Paratypes (2♂, 1♀). [Cameroon]: 1♂, Cameroun, Massif du Manengouba, Piste Bakwati-Mwakoumel, 1240 m, 11. et 12.IV.1972 (C. Herbule). 1♂, Kamerun, Lolodorf, 1894–1895 (L. Conradt); Ex Oberthür Collection Brit. Mus. 1927–3.; Geometridae genitalia slide No. 17526 (BMNH). **Angola:** 1♀, Quirimbo, 75 km E. of P. Amboim, 300 m, 7–12 May 1934; Angola (Dr. K. Jordan); *Milocera* not matched at Tring [rest undecipherable]; Geometridae genitalia slide No. 17527 (BMNH). (BMNH, C. Herbule collection).

**FORE WING LENGTH.** 11–12 mm (♂), 12 mm (♀).

**ADULT** (Fig. 50). Slightly larger than the preceding species. Apex of fore wing not or only very faintly falcate. Ground colour of wings ochreous. Two of the

three known ♂♂ nearly wholly suffused with brown, leaving only costa of hind wing free, and with a faint purple sheen. The other ♂ and ♀ of ground colour, with intense brown irroration. Fore wing with rudimentary basal and well developed, slightly concave postmedian line; hind wing with postmedian only. Discal spots present but poorly defined and not conspicuous. Underside orange-brown with ground colour more intense on fore wing; both wings with intense, fine greyish-brown striation. Postmedian and discal spots faint. Vestiture of thorax and abdomen brown. Hind tibia of ♂ somewhat dilated. Scale patch on A3 small.

**MALE GENITALIA** (Fig. 520). Uncus large, triangular, arising from broad base. Gnathos well developed. Costa of valve comparatively slender, straight, with a large, blunt ventral process near base. Sacculus pointed, triangular and exhibiting a triangular, sclerotized plate. Aedeagus strongly tapering anteriorly; vesica with two pairs of large, heavily chitinized cornuti; outer pair considerably larger. Octavals not strongly sclerotized, broadly rounded, flanked by a pair of hair-brushes on distal margin of A8.

**FEMALE GENITALIA** (Fig. 759). Papillae anales normally developed; apophyses long, notably a. posteriores. Sterigma forming extensive but weakly sclerotized, convoluted structure on both sides of ostium. Bursa copulatrix very stout, bulbous. Corpus bursae entirely spinose; denticles in posterior part long.

**DIAGNOSIS.** This species might be confused with 5. *M. sexcoruuta* and 6. *M. herbulei*, above. Although the postmedian line appears to be more strongly developed in *M. scoblei*, dissection of the genitalia is recommended for reliable identification. In the ♂, *scoblei* is easily recognized by the vesica bearing four, not six, cornuti. The female genitalia of *sexcoruuta* and *scoblei* are similar (the ♀ of *herbulei* being as yet unknown), but the bursa copulatrix of *scoblei* is larger and more evenly rounded, while the sterigma extends further away from the ostium.

**BIOLOGY.** *Milocera scoblei* is presumably associated with forests; the recorded altitudinal range is 300–1240 m. Adults have been collected in April–May and November.

**DISTRIBUTION.** Recorded from Cameroon and Angola.

**ETYMOLOGY.** I have pleasure in naming this species after M.J. Scoble of The Natural History Museum, London, who first proposed this study.

## 13. *Milocera aurora* sp. n.

Figs 51; 521, 760; 972

**TYPE MATERIAL.** Holotype ♂, [Zimbabwe]: Salis-

bury Dist[rikt], Dep[ar]t[ment] [of] Agric[ulture] S[outhern] Rhodesia, 17.I.1943; E.C.G. Pinhey Collector; Accession No. 5767 (TM). Paratypes (1♂, 11♀, 1♀, *ibidem*, dated 31.I.1943. [Zimbabwe]: 3♀, Princess E[lisabeth] Dam, Salisbury Dist., Dept. Agric. S. Rhodesia, dated 9.II.1947 (2), 22.II.1947 (1) (E.C.G. Pinhey); 3♂, 1♀, Salisbury, 9.III.[19]69 (A.J. Duke); 1♂, *ibidem*, 26.II.[19]78 (A.J. Duke); 1♂, Hunyani, Salisbury Dist., Dept. Agric. S. Rhodesia, 12.III.1944 (E.C.G. Pinhey); 1♀, *ibidem*, 26.XII.[19]78 (N.J. Duke); 1♀, Wingate, 11.IV.[19]71 (A.J. Duke); 2♂, Umwindsdale, 4.I.[19]69 (A.J. Duke); 1♂, Christon Bank, 22.X.[19]92 (N.J. Duke); 1♀, *ibidem*, dated 29.XII.[19]75 (A.J. Duke); 1♂, Victoria Falls, 21.1.1955 (D.W. Rorke). 2♂ 1♀, S. Rhodesia, Marandellas, dated I.1962 (2♂) (1 dissected, NMBZ genitalia slide L 690) and XII.1961 (♀) (NMBZ genitalia slide L 691); 1♂, Tobacco Res[earch] Board Salisbury, S. Rhodesia, July-Aug[ust] 1968. 1♀, S. Rhodesia, Lowdale, 15.II.1969 (A.J. Duke), Brit. Mus. 1981–398; 1♂, Mashonaland, Salisbury, IV.1905 (G.A.K. Marshall) 1906–21. **Angola:** 1♀, Makweta, 23.IX.1903 (Dr. Ansorge), [largely undecipherable handwritten label]; Rothschild Bequest B.M. 1939–1. **Malawi:** 1♀, N., Mzuzu, 4500 ft., 2.I.1993 (R.J. Murphy). **[Zaire]:** 1♂, Coll. Mus. Tervuren, E[lisabeth]ville, 11.5.1951 (Ch. Seydel) (Coll. C. Herbulot) – (TM, NMBZ, BMNH, C. Herbulot collection, N.J. Duke collection).

**FURTHER MATERIAL.** 8♂ and 2♀. **Kenya:** Mt. Elgon (5); Muhoroni (1). **Tanzania:** Mukuyu, Kigoma (1). **Zambia:** Abercorn (2); Mbala near Abercorn (1). 10 Nairobi (NMKE).

**FORE WING LENGTH.** 12–13 mm (♂), 12–15 mm (♀).

**ADULT (Fig. 51).** A large *Milocera* species. Costa of fore wing convex and apex falcate, though not strongly so. Ground colour of wings pale to vividly yellow and with brownish grey striation of varying intensity. Postmedian area of fore wing suffused with light brown and often displaying a rounded, dark grey spot. Lines reduced, but two dark maculae on costa of fore wing indicating position of basal and postmedian. Dark specimens exhibiting an ill-defined, incomplete, greyish postmedian fascia. Discal spots present but quite faint. Underside similar but with dark irroration noticeably coarser, and lacking suffusion in postmedian area of fore wing. Vestiture of thorax and abdomen yellowish ochre, mixed with dark scales. Hind tibia of ♂ somewhat swollen, bearing a short hair-pencil near tibio-femoral joint. Scale patch on A3 well developed.

**MALE GENITALIA (Fig. 521).** Uncus triangular to trapezoidal, with small tip folded downwards. Gnathos strongly developed. Costa of valve sturdy, gently curved and with a small ventral process near base. Sacculus large and somewhat asymmetrical, trapezoidal and unarmed on one side, triangular with a small triangular

plate on the other. Aedeagus short and massive, tapering strongly anteriorly. Vesica with a large, strongly curved inner, and a smaller, straight outer pair of heavily chitinized cornuti. Octavals in shape of a slightly cleft, sclerotized lip. Distal margin of A8 bearing a pair of hair-pencils.

**FEMALE GENITALIA (Fig. 760).** Papillae anales large. Apophyses posteriores long and thin; a. anteriores much stouter, reaching about half length of former. Sterigma as in figure, forming two large lobes on sides of ostium. Bursa copulatrix very short and stout; wall of corpus bursae opaque, with relatively few denticles.

**DIAGNOSIS.** The bright yellow coloration, flushed distally with reddish brown on the fore wings, renders this species quite unmistakable. The only other yellowish species, *7. Milocera pyrinia*, above, is much smaller and has a well developed postmedian line.

**BIOLOGY.** The Zimbabwean material was presumably collected in a savanna habitat, though nothing is known about habitat preferences in the remaining part of its range. In Zimbabwe, adults have been collected from December to August; in east Africa, records are from May to December.

**DISTRIBUTION (Fig. 972).** Mostly Zimbabwe, but also recorded from Malawi, Zambia, Kenya, Tanzania and Zaire. In south-western Africa known from Angola.

**ETYMOLOGY.** From the Greek goddess of the sunrise, Aurora, in allusion to the delicate light brown suffusion on the fore wings.

### 5. *Milocera ustata*-group

The three species that make up this group are closely related to the *M. diffusata*-group, above. They may be separated from it, however, by the broadly triangular and somewhat irregularly shaped sacculus, which lacks the serrated triangular plate. The females of all species are as yet unknown. It is possible that this assemblage is paraphyletic.

### Key to species

- 1 Fairly small, reddish-brown moths (fw length 11–12 mm) with extensive dark suffusion (Fig. 52), closely resembling some members of the *diffusata*-group. ♂ genitalia (Fig. 522) large, with strongly curved costa. Cameroon .....  
..... 14. *obfuscata* sp. n., p. 53
- Larger species (fw length 12–17 mm), ochreous with more or less extensive brown suffusion across wings (Figs 53, 54). ♂ genitalia as in Figs 523, 524. One species in Cameroon, the other restricted to east Africa (Rwanda, Uganda) ..... 2

- 2(I) Moths with dark suffusion across fore wing (Fig. 54). ♂ genitalia (Fig. 524) with greatly enlarged costa and a recurved process arising between costa and sacculus. Rwanda, south-west Uganda .....  
..... 16. *umbrosa* Herbolut, p. 53
- Pale ochreous moths with dark suffusion confined to fore wing apex (Fig. 53). ♂ genitalia (Fig. 523) with long and straight aedeagus. Cameroon .....  
..... 15. *ustata* Herbolut, p. 53

#### 14. *Milocera obfuscata* sp. n.

Figs 52; 522

TYPE MATERIAL. Holotype ♂, [Cameroon]: Bitje, Ja River, So[uth] Cameroons, April–June 1910, Lesser rains (G.L. Bates); *Azata diffusata* Warr. \* dark aberration [in Warren's hand]; Rothschild Bequest B.M. 1939–1; Geometridae genitalia slide No. 17740 (BMNH). Paratype (1 ♂). [Cameroon]: *ibidem*, 2000 ft (G.L. Bates); Rothschild Bequest B.M. 1939–1; Geometridae genitalia slide No. 17743 (BMNH).

FORE WING LENGTH. 11–12 mm (♂).

ADULT ♂ (Fig. 52). Similar to *M. diffusata* and *M. zika*, above, but upper and underside of wings darker due to extensive medium brown suffusion. Hind tibia of ♂ dilated, with well developed hair-pencil. Scale patch on A3 present.

MALE GENITALIA (Fig. 522). Uncus triangular, terminating in a well-defined tip, and densely setose. Gnathos moderately prominent, with medial element folded upwards. Costa of valve short, well sclerotized, narrow and strongly curved; hardly dilated apically. Sacculus membranous, triangular and somewhat scooped. Saccus very broadly rounded. Aedeagus short and massive, strongly tapering anteriorly. Vesica with a large, curved inner pair and a straight, considerably smaller outer pair of cornuti. Octavals rather weakly sclerotized, with a projecting median tooth. Distal margin of segment A8 bearing hair pencils.

DIAGNOSIS. Fairly similar to 9. *M. diffusata* and 10. *M. zika*, above, but characterized by much more prominent brown suffusion on both sides of the wings. In the male genitalia, the narrow, strongly curved costa is highly characteristic.

BIOLOGY. *M. obfuscata* is probably associated with lowland forest like the other members of this group. Adults are active April–June.

DISTRIBUTION. Cameroon.

ETYMOLOGY. From Latin *obfuscatus* (-a, -um), darkened or blackened: the dark brown suffusion is characteristic.

#### 15. *Milocera ustata* Herbolut, 1973

Figs 53; 523

*Milocera ustata* Herbolut, 1973a: 75. Holotype ♂,

[Cameroon]: Cameroun, Forêt de Bafout-Nguemba, 8 km SSE. de Bamenda, 2080 m, 4. et 5.IV.1970 (C. Herbolut et C. Lemaire) (C. Herbolut collection) [not examined]. The identity of the species is easily established from the description. Paratypes (3♂). 2♂, [Cameroon]: same data as holotype; 1 dissected, Pr[éparation] No. 4926 C. Herbolut, *Milocera ustata* Hrblt. Paratype (C. Herbolut collection) [examined]. 1♂, *ibidem*, 3.–5.IV.1972 (C. Herbolut). (C. Herbolut collection) [1♂ examined].

FORE WING LENGTH. 13–15 mm (♂).

ADULT ♂ (Fig. 53). A large and pale *Milocera* species. Fore wings ample with well-rounded tips. Ground colour of wings pale ochreous, with sparse, fine grey irroration. Fore wings distally of discal spots suffused with dark greyish brown. Lines absent except for hardly discernible traces of postmedian on fore wing. Discal spots dark grey, rather conspicuous. Underside similar but irroration coarser; dark apical patch on fore wing less distinct. Vestiture of thorax and abdomen concolorous with wings, ochreous mixed with grey scales. Hind tibia of ♂ simple. Scale patch on A3 not detectable in slide preparation examined.

MALE GENITALIA (Fig. 523). Uncus approximately triangular, very broad. Gnathos band-like, central portion not strongly expanded. Costa of valve slender, hardly dilated apically and with a slight kink near middle. Sacculus large and triangular, asymmetrical in examined specimen (cf. figure). Aedeagus long and approximately cylindrical; vesica bearing one short and one long pair of strongly chitinized, acutely pointed cornuti. Octavals consisting of a sclerotized, boat-shaped lip. Short hair pencils present on distal margin of A8.

DIAGNOSIS. *Milocera ustata* may be confused with 8. *M. ustatooides*, above, but can immediately be recognized by the rounded apex of the fore wing (acute in *ustatooides*). Distributional data also appear to be useful, as *ustata* is only known from Cameroon, while *ustatooides* seems to be confined to Tanzania.

BIOLOGY. The few specimens known have been collected in tropical forests around 2000 m. Adults are active in April.

DISTRIBUTION. Cameroon.

MATERIAL. Only the ♂ paratype listed above was seen.

#### 16. *Milocera umbrosa* Herbolut, 1989

Figs 54; 524

*Milocera umbrosa* Herbulot, 1989: 3. Holotype ♂,

**Rwanda:** Sud-Ouest, Wincka, 2700 m, 21.–22.VI.1974 (B. Turlin) (C. Herbulot collection) [not examined]. The identity of this species was established from the original description. Paratypes (4♂). 1♂, *ibidem*, dated 19.–20.VI.1974 (B. Turlin); Pr[éparation] No. 5895 C. Herbulot; *Milocera umbrosa* Hrblt. ♂ paratype. 1♂, **Rwanda:** Sud-Ouest, Nyungwe Forest, route Delvaux au km 21, 2000 m, 4.XI.1974 (B. Turlin). 1♂, **Rwanda:** Nord-Ouest, Forêt Gishwati, Nyamyumba, 2000 m, 24.V.1974 (B. Turlin). 1♂, **Rwanda:** Nord-Ouest, Forêt Gishwati, Kayove, 2000 m, 28.V.1976 (B. Turlin) (C. Herbulot collection) [1♂ examined].

FORE WING LENGTH. 15–17 mm (♂) (Herbulot, 1989).

ADULT ♂ (Fig. 54). The largest species of *Milocera*. Fore wings with convex costa and strongly falcate apex. Ground colour of wings ochreous, suffused with dark brown, especially on fore wing, and with a faint purple sheen; in addition fairly dense greyish striation present. Basal and median line reduced, but position of former on costa of fore wing marked by a blackish macula. Postmedian well developed on both wings, concave on fore- and slightly convex on hind wing. Discal spots present, dark grey. Underside ochreous, suffused with brown on fore wing but leaving inner margin pale. Wings with fairly coarse dark brown irroration, particularly on hind wing. Postmedian line and discal spots heavy on hind wing, less well developed on fore wing. Vestiture of thorax and abdomen ochreous-brown. Hind tibia of ♂ slightly swollen, bearing some fine, yellowish hairs on inner side. Setal patch on A3 apparently absent.

MALE GENITALIA (Fig. 524). Uncus triangular, arising from broad base and terminating in beak-like tip. Gnathos cingulate, strongly developed. Costa of valve large, produced ventrally into a broad lobe. Sacculus small by comparison, somewhat triangular, curved. A recurved digitate process arising between costa and sacculus. Saccus short, pointed. Aedeagus large, tapering anteriorly. Vesica bearing a small inner pair of curved, and a larger, outer pair of straight cornuti. Octavals broadly w-shaped, weakly sclerotized. Distal margin of A8 lacking hair-pencils.

DIAGNOSIS. Its large size, dark coloration and strongly falcate fore wings render this species quite unmistakable.

BIOLOGY. *M. umbrosa* is apparently a rain forest species that occurs at altitudes from 2000–2700 m. Adults have been collected from March to June and in November.

DISTRIBUTION. Central parts of East Africa, with records from Rwanda and south-west Uganda.

MATERIAL. 6♂ (I dissected, genitalia slide L 693) (NMBZ). 1 Bulawayo (NMBZ), 5 Nairobi (NMKE).

LOCALITIES. **Uganda:** SW., Kigezi, Mafuga rain forest (3); SW., Kigezi, Impenetrable Forest (3).

## 2. Subgenus *Meiocera* subgen. n.

Type species: *Milocera arcifera* Hampson, 1910: 469. by present designation.

DIAGNOSIS. Species of the subgenus *Meiocera* are characterized by a club-shaped aedeagus which does not bear cornuti on the vesica. In all but one species (*M. dubia*, Fig. 530), the apical half of the aedeagus has conspicuous striations.

DESCRIPTION. Medium-sized to large species with ochreous-grey or dark brownish-olive coloration. Apex of fore wing weakly to strongly falcate. Tip of abdomen of male of some species bearing hair-pencils.

MALE GENITALIA. Uncus attenuated, usually long. Gnathos small to well developed and lost in two species. Valvae with costa bearing groups of long spines, in shape triangular and more or less strongly scooped (e.g., Fig. 526) or hammer-headed (Fig. 529). Sacculus tongue-shaped (Fig. 528), occasionally truncated (Fig. 527). Saccus forming a short but massive tip. Aedeagus elongated and club-shaped (e.g., Fig. 525). Vesica without cornuti, but in most species displaying prominent striations on apical half. Octavals present and arcuate (Fig. 528), pincer-like (Fig. 530) or shallow, with rounded tips (Fig. 527).

FEMALE GENITALIA. Papillae anales well developed, somewhat pointed. Apophyses slender. Sterigma prominent, in some species consisting of broad transverse bands (Figs 761, 764). Operculum present (Fig. 761) or absent. Bursa copulatrix pear-shaped. Ductus bursae short, sometimes swollen (Fig. 762). Corpus bursae fairly large; bursa wall densely spinose anteriorly, membranous with some longitudinal carinae posteriorly.

ETYMOLOGY. From *Milocera* and Greek μειόν, to reduce; in allusion to the absence of cornuti on the vesica. Gender: feminine.

## 6. *Milocera arcifera*-group

The *M. arcifera*-group contains five species. They are apparently closely related to the following group, but can be separated by two apomorphies of the male genitalia. These include the position of spines on the costa, which may be situated apically or, more often, along the outer margin, and the presence of a finely ribbed apical or subapical zone on the aedeagus.

### Key to species

- 1 Large, greyish moths (Fig. 60). ♂ genitalia (Fig. 529) with hammer-headed costa, bearing two groups

- of large spines; sacculus much smaller than costa. ♀ unknown ..... 21. *hypamycha* sp. n., p. 55
- Moths ochreous or dark olivaceous brown (Figs 55–59). ♂ genitalia (Figs 525–528) not as above. ♀ genitalia, where known, as in Figs 761, 762 ..... 2
- 2(1) ♂ genitalia (Figs 526, 527) having valvae with scooped costa, terminating in a narrow process. ♀ genitalia, where known, as in Fig. 762 ..... 3
- ♂ genitalia (Figs 525, 528) with costa of valve straight or, if scooped, not terminating in slender process. ♀ genitalia, where known, not as above (Fig. 761) ..... 4
- 3(2) ♂ genitalia (Fig. 526) with costal process long; hair-pencils present on distal margin of A8. ♀ unknown. Zaire, Congo Republic, Cameroon, Uganda, Kenya ..... 18. *pelops* sp. n., p. 55
- ♂ genitalia (Fig. 527) appearing much stouter; costal process short. No hair-pencils present on distal margin of A8. ♀ genitalia (Fig. 762) with large, rounded bursa copulatrix. Cameroon and Nigeria ..... 19. *divorsa* Prout, p. 56
- 4(2) Adults with falcate fore wings (Fig. 59). ♂ genitalia (Fig. 528) with costa and sacculus widely separated and of approximately equal length. Aedeagus short. ♀ unknown. Guinea, Cameroon ..... 20. *thyestes* sp. n., p. 57
- Adults with weakly falcate fore wings (Figs 55, 56). ♂ genitalia (Fig. 525) with costa and sacculus relatively closely together; sacculus markedly shorter than costa. ♀ genitalia (Fig. 761) pear-shaped, with strongly developed sterigma. Southern parts of central Africa (Angola, Malawi, Tanzania) ..... 17. *arcifera* (Hampson), p. 55

## 17. *Milocera arcifera* (Hampson, 1910)

Figs 55, 56; 525, 761

*Tephrina arcifera* Hampson, 1910: 469. Holotype ♂, [Zambia]: Type; N.E. Rhodesia, E[ast] of L[ake] Bangweolo, near L[owe]r Chambezi, 4000 ft., 23.X.1908 (A.S.Neave), 1909.122; *Tephrina arcifera* Hmpsn. ♂ type (BMNH) [examined].

FORE WING LENGTH. 13–16 mm (♂), 15 mm (♀).

ADULT (Figs 55, 56). A fairly robust *Milocera*. Fore wing with rounded, hardly falcate apex. Ground colour of wings yellowish ochre, suffused with pale leather brown in postmedian area, and with fine, light brown striations. Basal and median line absent. Postmedian oblique, prominent on both wings, and double ochre and brown. Discal spots inconspicuous. Underside yellowish ochre with coarse and somewhat uneven brown irroration. Postmedian area with a broad, greyish brown fascia, broken up by intersecting veins. Vestiture of thorax and abdomen concolorous with wings, ochreous to olivaceous. Hind tibia of ♂ not

modified. Setal patch on A3 absent. Variation. Wing colour ranges from light ochreous to a rather dark shade of olive grey; in the first case, the postmedian line appears double ochreous-and-brown while ochreous only in the dark specimens.

MALE GENITALIA (Fig. 525). Uncus prominent, attenuated. Gnathos large but not strongly chitinized, ending in a long, tongue-shaped process. Costa of valve lanceolate, distal half of inner margin bearing a double series of long spines. Sacculus relatively narrow, about two-thirds length of costa, slightly scalloped. Saccus produced into a moderately long tip. Aedeagus elongated, subcylindrical and strongly tapering anteriorly. Apical portion densely ribbed, bearing a very thin, needle-like cornutus. Octavals consisting of a weakly sclerotized lip, as in figure. Distal margin of A8 covered with long hairs ventrally, and forming hair-pencils on sides.

FEMALE GENITALIA (Fig. 761). Papillae anales normally developed, rounded. Apophyses relatively long, slender. Sterigma large, forming petal-like extensions emanating from ostium. Operculum present. Bursa copulatrix pear-shaped; wall of corpus spinose.

DIAGNOSIS. Similar to 22. *M. dubia*, below, but easily separated from that species by the rounded fore wing tips (strongly falcate and pointed in *dubia*).

BIOLOGY. Adults have been collected in February–March and June; the recorded altitudinal range is 1800–1900 m.

DISTRIBUTION. Southern parts of central Africa, recorded from Angola, Malawi and Tanzania.

MATERIAL. 3♂ (1 dissected, Geometridae genitalia slide No. 17529) (BMNH) and 2♀ (dissected, Geometridae genitalia slide No. 17530 (BMNH); NMKE genitalia slide No. 65). 4 London (BMNH), 1 Nairobi (NMKE).

LOCALITIES. **Angola:** Mt. Moco, Lumbale, 1800–1900 m (1). **[Malawi]:** Nyasa, Zomba (2). **[Tanzania]:** Lac Tanganyka [sic] (1); Kigoma Prov., Mukuyu (1).

## 18. *Milocera pelops* sp. n.

Figs 57; 526

[*Milocera divorsa pelops* Prout. Manuscript name]

TYPE MATERIAL. Holotype ♂, [Zaire]: Type H[olo] T[type], 35.24. South side middle Lowa Valley, south of Walikali, W. Kivu, 3500 ft., forest. March [19]24, Wet season (T.A. Barns); Jocey Bequest Brit. Mus. 1934–120.; *Milocera divorsa pelops* Prout ♂ type; Manuscript name; Geometridae genitalia slide No. 17532 (BMNH) [examined]. Paratypes (7♂). **[Zaire]:** 1♂, Congo Belge, Bena Dibele, Sankuru Kasai, April 1959 (R.H.

Carcasson) (dissected, NMKE genitalia slide No. 69); 1♂, 35. 24; Upper Oso River, N.W. Kivu, 4000 ft., forest with some grass, Feb[uary] [19]24, Wet season (T.A. Barns); Joicey Bequest Brit. Mus. 1934–120.; Geometridae genitalia slide No. 17551 (BMNH). **Republic of Congo:** 1♂, Rep[ublique] Pop[ulaire] [de] Congo, 15 km SSW. Ouedo, 24.VI.1984 (C. Herbulot); Pr[éparation] No. 6964 C. Herbulot. **Cameroon:** 1♂, Cameroun, Ayos, Galerie du Nyong, 15 km E. de M'Balmayo, 25.VI.1974 (Apollinaire Fotié); Pr[éparation] No. 6962 C. Herbulot. 1♂, Cameroun, Massif du Manengouba, 6 km NO. de Nkongsamba, 1400 m, 3.IV.1970 (C. Herbulot et C. Lemaire); Pr[éparation] No. 6184 C. Herbulot; t[ou]t à fait conforme au paratype de *divorsa*, London 1970 [label in Herbulot's hand]. **Uganda:** 1♂, Malabigambo Forest, Sango Bay, Uganda, Feb[uary] 1968 (A.L. Archer) (dissected, NMKE genitalia slide No. 66). **Kenya:** 1♂, Malaba Forest, Kenya, June 1957 (C.R. Howard) (dissected, NMKE genitalia slide No. 68). (BMNH, NMKE, C. Herbulot collection).

FORE WING LENGTH. 12–13 mm (♂).

**ADULT ♂** (Fig. 57). A medium-sized *Milocera* of very sombre appearance. Fore wings scarcely falcate. Ground colour ochreous, but wings wholly suffused with dark olivaceous grey. Fore wing with inconspicuous, dark, zigzagging basal and straight or slightly concave, double ochreous-and-brown postmedian line; hind wing with postmedian line only. Discal spots present but inconspicuous. Underside strikingly marked, vividly ochreous with dense dark brown striation and brown suffusion over most of fore wing and on apex of hind wing. Discal spots faint to well developed. Vestiture of thorax and abdomen concolorous with wings, olivaceous grey on upper-, and ochreous, mixed with brown scales on underside. Hind tibia of ♂ dilated, bearing small hair-pencil below tibio-femoral joint. Scale patch on A3 absent.

**MALE GENITALIA** (Fig. 526). Uncus strong, moderately attenuated. Gnathos reduced. Costa of valve scalloped, terminating in a slender, rounded process; inner margin bearing a row of sclerotized bristles. Sacculus markedly shorter than costa, somewhat truncated and covered with soft hairs. Saccus ending in a stout, blunt tip. Aedeagus large relative to remainder of genitalia, gradually tapering anteriorly and displaying a narrowly ribbed band in posterior half; apex bulbous. Octavals broadly w-shaped with rounded tips. Distal margin of A8 bearing lateral hair-pencils.

**DIAGNOSIS.** *M. pelops* belongs to a complex of five dark and externally very similar species with moderately falcate fore wings. In all cases, dissection of the genitalia is necessary for reliable identification. In the male genitalia, *pelops* resembles only 19. *M. divorsa*,

below, but can at once be identified by the longer costal process. The differences to 24. *M. atreus*, 25. *tantalus* and 20. *thyestes* are evident from the illustrations (compare Figures 526, 528, 531, 532).

**BIOLOGY.** Label data indicate that this is a forest species. Adults have been collected February–April and in June; the recorded altitudinal range is 1300–1400 m.

**DISTRIBUTION.** West and Central Africa, with records from Zaire, the Congo Republic, Cameroon, Uganda and Kenya.

**FURTHER MATERIAL.** 4 ♂. **Uganda:** 3♂, Katera Sango Bay, Masaka; 1♂, Kayonza, Kigezi. 4 Nairobi (NMKE).

**ETYMOLOGY.** I retain the name Prout originally chose but did not publish for what he considered to be an aberration of *M. divorsa* (in Greek mythology, Pelops was the son of Tantalus).

## 19. *Milocera divorsa* Prout, 1922

Figs 58; 527, 762

*Milocera divorsa* Prout, 1922b: 360. Holotype ♂, [Cameroon]: Bitje, Kamerun, IX; (A. Heyne); Holotypus; Prout det.; *Milocera divorsa* Prout ♂ type/Nov[itates] Zool[ogicae] XXIX.360 (Apr[il] 1922) (DEI) [examined]. Paratype ♂, **Cameroon:** 19.20 Cameroons, Bitje, Ja River, Oct[ober], wet season (G.L. Bates); rather large & more strongly ma[rke]d than t[type] [label in Prout's hand]; Joicey Bequest Brit. Mus. 1934–120.; *Milocera divorsa* Prout ♂ paratype; Geometridae genitalia slide No. 17554 (BMNH) [examined]; ‘Allotype ♀’, [Cameroon]: ♀, Allotype; Bitje, Kamerun; (A. Heyne); *Milocera divorsa* Prout ♀ allotype; L.B. Prout Coll[ection] B.M. 1939–643; Geometridae genitalia slide No. 17533 (BMNH) [examined]. *Milocera divorsa* Prout; Fletcher, 1958b: 132.

FORE WING LENGTH. 13 mm (♂), 14–15 mm (♀).

**ADULT** (Fig. 58). A medium-sized *Milocera*; fore wing apex only slightly falcate. Ground colour of wings ochreous, suffused with leather brown or, more rarely, dark olivaceous brown, particularly along costa of fore wing and in postmedian area, and with dense dark brown striation. Fore wing with zigzagging basal and concave postmedian line, hind wing with postmedian line only; all lines thin, medium brown. Discal spots also brown, not conspicuous. Fore wing displaying a fairly large, round, brown spot, transected by postmedian line. Underside similar with coarser brown irroration; basal line and circular spot on fore wing not apparent. Vestiture of thorax and abdomen concolorous

with wings. Hind tibia of ♂ lost in examined specimen. Scale patch on A3 present.

**MALE GENITALIA** (Fig. 527). General aspect very compact. Uncus attenuated, massive; gnathos absent. Costa of valve scooped, terminating in a short, curved tip; inner margin bearing a row of short, heavily sclerotized bristles. Sacculus short and somewhat squarish, covered with soft hairs. Saccus drawn into fairly long, stout tip. Aedeagus elongated, strongly tapering anteriorly; apical region finely ribbed. Octavals large, w-shaped; no hair pencil present on A8.

**FEMALE GENITALIA** (Fig. 762). Papillae anales normal. Apophyses relatively long and thin. Sterigma simple, as in figure. Bursa copulatrix large for the genus, pear-shaped. Ductus bursae characteristically fluted; wall of corpus bursae densely spinose anteriorly, becoming more membranous towards ductus.

**DIAGNOSIS.** In facies, dark specimens may be confused with 18. *Milocera pelops*, above. However, both species can be readily separated by examination of the male genitalia: the process formed by the distal portion of the costa is markedly shorter in *divorsa*. The female genitalia of *pelops* are unknown.

**BIOLOGY.** Presumably an inhabitant of tropical forest. Adults have been collected during the wet season in October; the recorded altitudinal range is 900–1800 m.

**DISTRIBUTION.** Cameroon and Nigeria.

**MATERIAL.** 2♀ (1 dissected, Geometridae genitalia slide No. 17549) (BMNH). 1 London (BMNH), 1 C. Herbule collection.

**LOCALITIES.** **Cameroon:** Route Buéa-V.H.F. Ewonda, 900 m (1). **Nigeria:** Kumbo, 5500 ft (1).

## 20. *Milocera thyestes* sp. n.

Figs 59; 528

**TYPE MATERIAL.** Holotype ♂, [Guinea]: 47. 26. Macenta, 2000 ft., 2.–10., 19.–21.V.[19]26, French Guinea (C.L. Collenette); A.L.; *Milocera divorsa* Prout ♂ colour form [misidentification]; Joicey Bequest Brit. Mus. 1934–120.; Geometridae genitalia slide No. 17550 (BMNH). Paratypes (2♂). **Cameroon:** 1♂, Cameroun, Massif de Manengouba versant N.E., 2120 m, 5°02'N 9°51'E, 17.–18.IV.1976 (C. Herbule); Pr[éparation] No. 6963 C. Herbule. 1♂, Plateau de Kounden, 4 km S.E. Centre Vétérin, 1410 m, 6.–7.IV.1972 (C. Herbule); Pr[éparation] No. 6961 C. Herbule. (C. Herbule collection).

**FORE WING LENGTH.** 11–12 mm (♂).

**ADULT ♂** (Fig. 59). A relatively small *Milocera*. Costa of fore wing arched and apex falcate, but not strongly so. Ground colour of wings ochreous, but

densely and fairly evenly suffused with dark olivaceous grey, resulting in a very sombre appearance. Fore wing with weak, zigzagging basal line; the concave postmedian by contrast well developed on both wings, double ochreous-and-brown. Discal spots only indicated by groups of darker scales. Underside ochreous with intense olivaceous-grey irroration and some suffusion in postmedian area, leaving a crescent-shaped ochreous area on fore wing. Postmedian line indicated only; discal spots well developed. Vestiture of thorax and abdomen concolorous with wings, paler on underside. Hind tibia of ♂ only slightly dilated, bearing a small hair-brush near tibio-femoral joint. Setal patch on A3 present.

**MALE GENITALIA** (Fig. 528). Uncus long, strongly attenuated. Gnathos with unusually slender arms. Costa of valve comparatively narrow, scooped, and bearing a row of stout bristles along outer margin. Sacculus long, somewhat triangular and pointing away from costa. Saccus short, forming a distinct, blunt tip. Aedeagus small relative to size of genitalia, tapering anteriorly, and having the apical region finely ribbed. Octavals weakly chitinized, arched. A pair of large hair-pencils present on distal margin of A8.

**DIAGNOSIS.** *M. thyestes* belongs to a complex of four very similar species which can reliably be only separated by dissection of the genitalia. Those of the male of *thyestes* are characterized by the wide separation of costa and sacculus, resulting in an X-shaped aspect of the valves. The female genitalia are unknown.

**BIOLOGY.** The species is probably associated with forest. Adults have been collected in April and May at altitudes between 650 and 2120 m.

**DISTRIBUTION.** West Africa, with records from Guinea and Cameroon.

**ETYMOLOGY.** In Greek mythology, Thyestes was one of the sons of Pelops. The name is chosen because of the similarity of this species with *M. pelops*, above.

## 21. *Milocera hypamycha* sp. n.

Figs 60; 529

[*Milocera hypamycha* Prout. Manuscript name]

**TYPE MATERIAL.** Holotype ♂, [Rwanda]: Type H[olo] T[type]; 12.22. Rugege Forest, Ruanda Distr., Lake Kivu, 7000 ft., Dec[ember] 1921 (T.A. Barns); 003 177; Joicey Bequest Brit. Mus. 1934–120.; *Milocera hypamycha* Prout ♂ type; Manuscript name; Geometridae genitalia slide No. 17525 (BMNH). Paratypes (7♂). **Uganda:** Kayonza, Kigezi, Mar[ch] 1967 (R.C. Otieno) (NMKE).

**FORE WING LENGTH.** 13–15 mm (♂).

ADULT ♂ (Fig. 60). A large *Milocera*. Costa of fore wing arched, termen straight. Wings faintly glossy; ground colour cream with faint brownish-grey suffusion and with fine brownish striation along fore wing costa. Fore wing with reasonably clear, zigzagging basal and very faint, slightly concave postmedian line; hind wing without lines. Discal spots present but inconspicuous and minute on hind wing. Underside ground colour more ochreous, notably on hind wing, and grey suffusion largely restricted to fore wing. Dark brownish irroration along fore wing costa and on hind wing, where it forms two short, indistinct bands. Vestiture of thorax and abdomen pale ochreous mixed with dark scales, which form incomplete bands on anterior part of abdomen. Hind tibia lost in holotype. Setal patch on A3 absent.

MALE GENITALIA (Fig. 529). Uncus attenuated, arising from broad base. Gnathos resembling a narrow transverse band. Costa of valve angular, hammer-headed, with two groups of long spines on apex and tornus. Sacculus much smaller, tongue-shaped. Saccus terminating in a massive tip. Aedeagus slender, strongly tapering anteriorly; apical region ribbed. Octavals taking the shape of a weakly sclerotized, w-shaped lip. A pair of long hair-pencils present on distal margin of A8.

DIAGNOSIS. The whitish-grey wings and characteristic genitalia render this species quite unmistakable.

BIOLOGY. Apparently associated with afromontane forest; the holotype was collected in December at an altitude of approximately 2300 m.

DISTRIBUTION. Thus far only known from the Lake Kivu area in Rwanda.

ETYMOLOGY. The etymology of the name Prout selected is not altogether clear, but may have been derived from Greek ὑπό, beneath and Latin *nuceo*, to become mouldy, on account of the dirtyish-grey appearance of the underside.

MATERIAL. Known only from the holotype.

## 7. *Milocera dubia*-group

The *M. dubia*-group is structurally close to the *M. arcifera*-group, above. However, its members share three synapomorphies provided by the male genitalia: (i) costa of valve narrow, exhibiting a group of long spines arising from base; (ii) aedeagus club-shaped with small, subapical lateral flaps (not shown in Fig. 530 of *M. dubia* due to position of specimen on slide), and (iii) large and pincer-like octavals.

The group has a fairly wide distribution in the Afrotropical region, reaching Zimbabwe in the south.

## Key to species

- 1 Very sombre, dark olive-grey species (fw length 10–12 mm) (Figs 63, 64). ♂ genitalia (Figs 531, 532) having aedeagus with small lateral dilatations below apex. ♀ unknown ..... 2
- Paler, ochreous species with olive suffusion (fw length 12–16 mm) (Figs 61, 62). ♂ genitalia, where known, with aedeagus lacking lateral dilatations (Fig. 530). ♀ genitalia (Figs 763, 764) pear-shaped or rounded ..... 3
- 2(1) ♂ genitalia (Fig. 532) with broadly attenuated uncus; octavals acutely pointed; hair-pencils present on distal margin of A8. ♀ genitalia (not illustrated) with tubular, rather than pear-shaped bursa copulatrix. Uganda, Zaire; Liberia ..... 25. *tantalus* sp. n., p. 60
- ♂ genitalia (Fig. 531) with narrowly attenuated uncus; tips of octavals rounded; no hair-pencils present on distal margin of A8. ♀ genitalia unknown. Cameroon ..... 24. *atreus* sp. n., p. 59
- 3(1) ♂ genitalia (Fig. 530) with elongated valvae; octavals resembling pincers. ♀ genitalia (Fig. 763) with small, rounded bursa copulatrix; sterigma confined to small area around ostium. Ovampoland, Angola, Zimbabwe, Zambia, Zaire and Uganda ..... 22. *dubia* (Prout), p. 58
- ♂ unknown. ♀ genitalia (Fig. 764) with larger, pear-shaped bursa copulatrix; sterigma extending to posterior margin of segment. Ghana ..... 23. *aureolitoralis* sp. n., p. 59

## 22. *Milocera dubia* (Prout, 1917) stat. n.

Figs 61; 530, 763

*Discalma arcifera dubia* Prout, 1917b: 72. Holotype ♂, [Namibia/Angola]: N[orth] Ovampo L[and], 1890–1891 (H.W. Eriksson); *Discalma arcifera dubia* Prout ♂ type; Type (SAM) [abdomen lost] [examined].

*Discalma arcifera dubia* Prout; Prout, 1925: plate 16, Fig. 29.

*Milocera arcifera dubia* (Prout); Janse, 1932: 245.

FORE WING LENGTH. 12–14 mm (♂), 15–16 mm (♀).

ADULT (Fig. 61). A rather large *Milocera* with strongly falcate fore wings. Ground colour of wings ochreous, with thin to quite dense, even, olivaceous-grey irroration. Fore wing with weak and convex ochreous basal, and well developed oblique postmedian line, the latter double ochreous-and-brown. Hind wing with oblique double postmedian only. Discal spots dark grey, nearly absent to moderately well developed. Underside similar but irroration coarser; development of postmedian and discal spots as on upperside. Vestiture

of thorax and abdomen ochreous, mixed with olivaceous-grey scales. Hind tibia of ♂ slightly dilated, bearing hair-brush. Scale patch on A3 present.

**MALE GENITALIA** (Fig. 530). Uncus prominent, attenuated. Gnathos large, ending in a broad, tongue-shaped process. Costa of valve rather slender, sword-like; its base bearing a row of approximately nine strongly elongated spines. Sacculus short and squat, finely setose. Saccus comparatively small, ending in a broad tip. Aedeagus somewhat cigar-shaped, gradually tapering anteriorly and entirely smooth. Octavals pincer-like. No hair-pencils present on distal margin of A8.

**FEMALE GENITALIA** (Fig. 763). Papillae anales well developed. Apophyses posteriores long and thin, a. anteriores stouter, reaching about half length of former. Sterigma: l. antevaginalis shield-shaped, not particularly chitinized. L. postvaginalis forming complicated, intricately folded sclerotizations around ostium. Bursa copulatrix small and rounded; ductus bursae very short; wall of corpus completely spinose.

**DIAGNOSIS.** This species resembles 17. *M. arcifera*, above, and was originally described as a subspecies of it. *Milocera dubia* can, however, be easily identified by the strongly falcate fore wings, which are much more rounded in the other species. In the male genitalia, *dubia* is characterized by a group of long spines arising from the base of the costa and the pincer-like octavals. In the female genitalia, the bursa copulatrix of *dubia* is much smaller and more strongly rounded (compare Figs 761 and 763).

**BIOLOGY.** In Zimbabwe, *M. dubia* appears to be a savanna species, though nothing is known about its habitat in the northern part of its range. Adults have been collected in February, April–May, July–August and October–November.

**DISTRIBUTION** (Fig. 973). The relatively few known specimens indicate a wide but scattered distribution; the species has been recorded from Ovampoland on the Namibian-Angolan border, Angola, Zimbabwe, Zambia, Zaire and Uganda.

**MATERIAL.** 13♂ (1 dissected, NMBZ genitalia slide L 677) and 7♀ (1 dissected, NMBZ genitalia slide L 689), 4 London (BMNH), 1 Pretoria (TM), 2 Bulawayo (NMBZ), 9 Nairobi (NMKE), 4 N.J. Duke collection.

**LOCALITIES.** **Zimbabwe:** Christon Bank (2), Aberfoyle, Honde Valley (1), Salisbury (1), Busi Farm, Chippinga (1), Marandellas (2), Victoria Falls, Big Tree (1). **Zambia:** Abercorn (4); Mbala near Abercorn (5). **Angola:** SE., Zambezi-Kasai Watershed, 4000 ft (1). **[Zaire]:** Kafakumba, Katanga Distr. (1). **Uganda:** Ruwenzori, Nakitawa, 8400 ft (1).

### 23. *Milocera aureolitoralis* sp. n.

Figs 62; 764

**TYPE MATERIAL.** Holotype ♀, [Ghana]: Gold Coast, N[orth] Territories, Kete-Krachi (A.W. Cardinall), B.M.1925–62.; Joicey Bequest Brit. Mus. 1934–120.; Geometridae genitalia slide No. 17548 (BMNH).

**FORE WING LENGTH.** 13 mm (♀ holotype).

**ADULT ♀** (Fig. 62). A medium-sized species; fore wings falcate but tips rounded. Ground colour of wings ochreous, densely irrorated with olive and with additional olivaceous suffusion in postmedian area. Fore wings with indistinct convex basal and prominent, oblique, double brown-and-ochreous postmedian line; hind wing with postmedian line only. The olive discal spots inconspicuous, larger on hind wing. Underside similar but with much stronger contrast between ochreous ground colour and dark brown irroration and lines. Fore wing with a pale costal streak and a crescent-shaped pale area in postmedian area. Vestiture of thorax and abdomen concolorous with wings.

**FEMALE GENITALIA** (Fig. 764). Papillae anales and apophyses normally developed. Sterigma extensive, with wrinkled texture. Bursa copulatrix pear-shaped; ductus smooth, becoming very narrow towards ostium; corpus bursae spinose. Upper half of corpus with sclerotized, crescent-shaped structure from which emanate a number of coarse ribs.

**DIAGNOSIS.** Confusion is possible with *Milocera dubia*, above, and also with 25. *M. tantalus* and 20. *thlyestes*, although the latter two species are darker, as far as can be ascertained from the limited material available. In the female genitalia of *M. aureolitoralis*, the most useful characters for identification are provided by the extensive sterigma and the longitudinal ribs on the pear-shaped corpus bursae. The male genitalia are unknown.

**BIOLOGY.** Unknown. Possibly associated with tropical lowland forest.

**DISTRIBUTION.** West Africa (Ghana).

**ETYMOLOGY.** From Latin *aureus* (-a, -um), golden and *litoralis* (-e), of the coast; in reference to the type locality, the former Gold Coast.

### 24. *Milocera atreus* sp. n.

Figs 63; 531

**TYPE MATERIAL.** Holotype ♂, [Cameroon]: Kamerun, Lolodorf (L. Conradt) 1894–1895;

8.IV.[18]95; Ex Oberthür Coll. Brit. Mus. 1927-3.; Geometridae genitalia slide No. 17553 (BMNH). Paratypes (3♂). **Cameroon:** 1♂, Cameroun, Village Kala, 3°51'N 11°21'E, 7.VIII.1974 (Gilles Clément). 1♂, Cameroun, 8 km N. d'Edea, 8. et 9.IV.1970 (C. Herboulot); *divorsa* 'cloud form' after Prout [label in Herboulot's hand]. 1♂, Cameroun, Ayos, Galerie du Nyong, 15 km E. de M'Balmayo, 4 au 11.III.1973 (Ph. Darge); Pr[éparation] No. 6960 C. Herboulot. (C. Herboulot collection).

FORE WING LENGTH. 10-12 mm (♂).

ADULT ♂ (Fig. 63). Barely medium-sized; fore wings slightly falcate. Ground colour of wings light ochreous, completely suffused with dark olive-grey, leaving only sparse ochreous striation visible. Fore wing with very faint, convex basal and well developed, ochreous-and-brown oblique postmedian line. Hind wing with double postmedian line only. Discal spots not discernible. Underside pale ochreous with very dense and even dark olive-grey striation; a pale costal streak and crescent-shaped area in fore wing postmedian largely unstriated. Position of postmedian line marked by a narrow, ochreous fascia. Discal spots indistinct, larger on hind wing. Vestiture of thorax and abdomen of same colour as wings, lighter on underside. Hind tibia of ♂ not dilated; a small tuft of short hairs present near tibio-femoral joint. Scale patch on A3 present.

MALE GENITALIA (Fig. 531). Uncus attenuated; apex beak-like. Gnathos fairly well developed. Costa of valve narrow and triangular, with a group of straight and rather long spines arising from base. Sacculus small, about two-thirds length of costa and covered with fine hairs. Saccus ending in short, blunt tip. Aedeagus club-shaped, very broad posteriorly, then tapering gradually. Apical region with two triangular lateral extensions; vesica with localized ribbing. Octavals arcuate with rounded tips. No hair-brushes present on distal margin of A8.

DIAGNOSIS. This species closely resembles 25. *M. tantalus*, 20. *thyestes* and 18. *pelops* in facies, and dissection of the genitalia is necessary for reliable identification. In male genitalia structure the only similar species is *M. tantalus*, below. For a diagnosis see under that species. The male genitalia of both *M. thyestes* and *pelops* have the costa of the valve scooped (Figs 527, 529).

BIOLOGY. Adults have been collected in March and April.

DISTRIBUTION. Cameroon.

ETYMOLOGY. Named after Atreus, one of the sons of Pelops in Greek mythology, on account of the similarity of these species (see *M. thyestes*, above).

## 25. *Milocera tantalus* sp. n.

Figs 64; 532

TYPE MATERIAL. Holotype ♂, **Uganda:** Ruwenzori Range, xii.1934-i.1935, B.M. E[ast] Afr[ica] Exp[edition] B.M.1935-203.; Bwamba Pass (West side), 5,500-7,500 ft (F.W. Edwards); Geometridae genitalia slide No. 17534 (BMNH). Paratypes (4♂, 1♀). **[Zaire]:** 1♂, 35.24., Lowowo Valley, South Lowe Dist., W. Kivu, 4000 ft., mountain forest, March [19]24, wet season (T.A. Barns); *M. divorsa pelops* ab.? (undecipherable) div.? described [label in Prout's hand]; Joicey Bequest Brit. Mus. 1934-120.; Geometridae genitalia slide No. 17552 (BMNH); **Uganda:** 2♂, Impenetrable For[est], Kigezi, Uganda, Mar[ch] 1967 (R.C. Otieno) (1 dissected, NMKE genitalia slide No. 62); 1♀, Bwamba [sic], Uganda, May 19[58] (R. Carcasson) (dissected, NMKE genitalia slide No. 63). **Liberia:** 1♂, Grassfield, Nimba, Liberia, VII-VIII, 1967 (A. Forbes-Watson). (BMNH, NMKE).

FORE WING LENGTH. 11-12 mm (♂); 12 mm (♀).

ADULT (Fig. 64). Very similar in size and coloration to *M. atreus*, above. Apex of fore wing more strongly falcate and dark suffusion on upperside somewhat less dense. On underside, dark striation less even and discal spots and ochreous postmedian fascia clearer. Hind tibia of ♂ not dilated or swollen, bearing some hairs on inner side, but not forming hair-pencil. Scale patch on A3 present.

MALE GENITALIA (Fig. 532). Uncus well developed, attenuated. Gnathos also prominent, central part hardly wider than arms. Costa of valve slender, slightly recurved and bearing a single row of bristles; additionally, a group of strong straight spines arising from base. Sacculus small, not more than half length of costa, covered with soft hairs. Saccus forming a well defined tip. Aedeagus tapering strongly anteriorly; apical region finely ribbed, with two lateral lobes. Octavals arcuate, acutely pointed. A pair of medium-sized hair-brushes present on distal margin of A8.

FEMALE GENITALIA (not illustrated). Papillae anales broadly rounded. Both pairs of apophyses thin, a. anteriores about half length of a. posteriores. Sterigma expansive, trapezoidal. Ostium bursae wide, heart-shaped. Bursa copulatrix tubular, with ductus bursae hardly narrower than corpus. Wall of ductus clear, of corpus, spinose.

DIAGNOSIS. *Milocera tantalus* is easily confused with 24. *M. atreus*, 20. *thyestes* and also 18. *pelops*. Of these four species, *pelops* is relatively the largest and may also be recognized by its scarcely falcate fore wings. Of the remaining three species, *M. tantalus* has the fore wing most strongly falcate; also, it is the only species of

the group to occur in east Africa. Nevertheless, dissection of the genitalia is the only reliable means of identification. In the ♂, *pelops* and *thyestes* can immediately be identified by the characteristic shape of their valves, leaving *M. atreus* as the only species similar in both facies and male genitalia; *tantalus* may be separated from it *inter alia* by its less club-shaped aedeagus, more strongly pointed octavals and differently shaped uncus. In the ♀, the tubular, rather than pear-shaped, bursa copulatrix is longer than in the related species of which the genitalia are known..

**BIOLOGY.** According to label data, *M. tantalus* inhabits montane forests at altitudes between 1300 and 2500 m. Adults are active in December–January, March and May (east Africa) and July–August (west Africa).

**DISTRIBUTION.** Ruwenzori range and adjacent mountainous districts of Zaire; Uganda; Liberia.

**ETYMOLOGY.** In Greek mythology, Tantalus was the father of Pelops (after the phenotypical similarity of both species).

### Species of uncertain group placement:

#### 26. *Milocera falcula* Prout, 1934

Not illustrated

*Milocera falcula* Prout, 1934b: 93. Holotype ♀, [Zaire]: Type; Musée du Congo, Montagnes à l'O.W. de Nyamukubi (2600 m), 9.XI.1932 (L. Burgeon); R. Dét. ♀2804; *Milocera falcula* Prout ♂ type (MRAC) [examined; abdomen missing].

**FORE WING LENGTH.** 12 mm (♀ holotype).

**ADULT ♀.** Medium-sized. Fore wings with convex costa; apex markedly falcate. Wings slightly glossy. Ground colour light ochreous, suffused with leather brown on fore wing, particularly towards apex, and with fairly intense brown striation. Median line on fore wing brown, convex; postmedian of same colour, concave. Both lines well developed. Hind wing with faint traces of postmedian only. Discal spots blackish, small on fore wing, minute on hind wing. Underside ochreous with coarse brownish irroration; markings shining through from upperside. Vestiture of thorax and abdomen ochreous brown.

**FEMALE GENITALIA** (not illustrated). Lost in holotype.

**DIAGNOSIS.** Although the genitalia remain unknown, *M. falcula* is easily recognized on account of the well developed brown lines on the fore wing, and confusion with other species of *Milocera* is unlikely.

**BIOLOGY.** Judging from label data of the holotype, the species occurs in afromontane tropical forest at an altitude of 2600 m.

**DISTRIBUTION.** Zaire.

**MATERIAL.** Known only from the holotype.

### 6. Genus *PLATYPEPLA* Warren, 1900

*Platypepla* Warren, 1900: 96. Type species: *Platypepla nudaria* Warren, 1900, *ibidem*: 96, by original designation. Type locality: South Africa.

*Platypepla* Warren; Janse, 1932: 202.

**GENERAL APPEARANCE** (Figs 65–81). Small moths (fore wing length 8–11 mm) of yellowish, ochreous or brown coloration with marked sexual dimorphism. Forewings narrow in males of most species. Costa of forewing arched, apex slightly falcate. Hind wing broad, rounded. Wing pattern simple, consisting of straight median and angled postmedian line on fore wing; position of lines usually marked by small, dark maculae along forewing costa. Markings occasionally largely reduced; discal spots may become totally reduced. Females broader-winged, with extensive greyish-green spotting and dark irroration and broad, ill-defined basal (fore wing) and postmedian fascia (both wings). Head: antennae ciliate in both sexes, with longer ciliae in male. Frons smooth, oblique. Labial palpi short, obtuse, porrect or slightly drooping; 1–1.5 times diameter of eyes in length. Proboscis well developed. Hindtibia of male normal and lacking hair-pencil or somewhat swollen and then bearing a hair-pencil originating near femur.

**VENATION** (Fig. 13). Fore wing: Sc and R<sub>1+2</sub> fused for a short distance, or Sc curved towards R<sub>1</sub> near end of cell and anastomosing with it for a shorter or longer distance or touching, but not anastomosing with R<sub>1</sub>. Radials variable: R<sub>2–5</sub> stalked, with R<sub>2</sub> and R<sub>3</sub> coincident, or R<sub>3+4</sub> stalked, or R<sub>2+3</sub> and R<sub>4</sub> stalked, or R<sub>3–5</sub> stalked; 1A and 2A separate for some distance near base of wing; fovea present and prominent, with corrugated internal membrane in some species or 1A with short process but not forming fovea. Hind wing: Sc+R<sub>1</sub> and Rs approximated but not touching; 2A present but not reaching beyond cell or absent as a tubular vein and then its position being indicated by a fold.

**MALE GENITALIA** (Figs 533–544). Uncus triangular and rather narrow. Gnathos present but small and weakly sclerotized. Tegumen plus vinculum forming a usually well-rounded capsule. Costa and sacculus of valve entirely separated; costa in most species rather slender and arm-like, bearing a number of spines, and frequently with a shorter, arm-like process arising near base. Sacculus taking the shape of a long, triangular to rounded lobe, without any sclerotizations and usually surpassing costa in length; in *P. schistopenis* bearing paired, highly conspicuous processes. Saccus short and rounded in *P. schistopenis*, more prominently developed in other species. Aedeagus small even for the size of the moths, more or less cylindrical; vesica lack-

ing cornuti. Octavals absent or consisting of a narrow sclerotized lip bearing a row of scale-like setae but well developed, although weakly sclerotized, in *P. curvigliadiata*.

**FEMALE GENITALIA** (Figs 765–770). Papillae anales well developed. Apophyses thin; a. anteriores markedly shorter than a. posteriores. Sterigma with l. antevaginalis very extensive, though weakly sclerotized and frequently bearing a central, canal-like structure of unknown function. Bursa copulatrix very small relative to size of abdomen; ductus bursae extremely short, corpus bursae rounded, with anterior portion of bursa wall spinose. In two species, bursa copulatrix attached to sterigma at an angle of about 90°; this condition has not been observed in any other platypeline.

**EARLY STAGES AND BIOLOGY.** According to label data, several species have been reared on *Loranthaceae*. The only material available for study consists of single pupal exuvia of *P. macilenta* and *P. griseobrunnea* (damaged). Pupa. General structure as described for the tribe; spindle-shaped and strongly tapering caudad. Cuticle light medium brown with coarse sculpture. Length (including cremaster) 7.3 mm; greatest width 2.8 mm. Cremaster small, rhomboid, with short and filamentous lateral processes (Fig. 6a).

**DISTRIBUTION** (Figs 974–976). Most diverse in the western parts of southern Africa but extending northwards to Kenya and Nigeria.

## Key to species

- 1 Median and postmedian line on forewing of males completely formed and not becoming fainter towards inner margin (Figs 80, 81). Females unknown. Kenya, Nigeria ..... 2
- Median and postmedian line on forewing of males incomplete or becoming much fainter towards inner margin (Figs 65, 67–69, 71–73, 75, 77–79). Females, where known, as in Figs 66, 70, 74, 76 (♀ of *P. griseobrunnea* not illustrated). Southern Africa; 2 species in Kenya ..... 3
- 2(1) Forewings narrow, apex forming a projecting tooth (Fig. 81). Male genitalia (Fig. 544): costa of valve baton-shaped, with a strong, downward-facing ventral process; aedeagus not cleft, with one large, sword-like cornutus on vesica ..... 13. *curvigliadiata* sp. n., p. 70
- Forewings broader, apex only slightly falcate (Fig. 80). Male genitalia (Fig. 543): costa triangular, without process; aedeagus cleft, without cornuti on vesica ..... 12. *schistopenis* sp. n., p. 70
- 3(1) Lines on forewing of males indistinct (Figs 65, 67, 68); females, where known, as in Fig. 66. Male genitalia (Figs 533–535): costa somewhat triangular, without processes; sacculus strongly elongated. Female genitalia, where known, as in Fig. 765 .... 4
- Lines on forewing of males distinct, although occasionally faint (Figs 69, 71–73, 75, 77–79); females, where known, as in Figs 70, 74, 76. Male genitalia, where known, (Figs 536–542): costa slender, arm-like, with simple or cleft process arising from base; sacculus broader and less strongly elongated. Female genitalia, where known, as in Figs 766–770 ..... 6
- 4(3) Costa of valve with a single, prominent ventral spine or tooth (Fig. 534). Female unknown. Namibia ..... 2. *jordani* sp. n., p. 64
- Costa of valve bearing 5 or more prominent spines along termen (Figs 533, 535). Female, where known, as in Fig. 66; female genitalia as in Fig. 765. Southern Africa excluding Namibia; Ethiopia ..... 5
- 5(4) Costa of valve with about 7, fairly small spines spread over ventral surface (Fig. 533). Female as in Fig. 66; female genitalia as in Fig. 765. Southern Africa, including Zimbabwe and Moçambique ..... 1. *spurcata* (Warren), p. 63
- Costa of valve with 5 larger spines placed along termen (Fig. 535). Female unknown. Ethiopia ..... 3. *uhlenhuthi* sp. n., p. 64
- 6(3) Moths yellowish or ochre, with brown or orange-brown suffusion on fore wings (Figs 69–72) ..... 7
- Moths entirely yellowish or ochre, without brownish suffusion on fore wings (Figs 73–79) ..... 9
- 7(6) Adult (Fig. 72) with orange-brown suffusion and well developed costal marks. ♂ genitalia (Fig. 538) with long, relatively narrow sacculus; aedeagus and octavals as illustrated. ♀ unknown. Northern central Namibia ..... 6. *loranthiphaga* sp. n., p. 66
- Adults (Figs 69–71) with brown or greyish-brown suffusion and less prominent costal marks. ♂ genitalia (Figs 536, 537) not as above. ♀ genitalia as in Figs 766, 767. Absent from northern central Namibia ... ..... 8
- 8(7) Adult as in Figs 69, 70. ♂ genitalia (Fig. 536) with short sacculus and short, apically cleft aedeagus. ♀ genitalia (Fig. 766) with corpus bursae in normal position. KwaZulu-Natal, including the former Transkei ..... 4. *macilenta* sp. n., p. 65
- Adult ♂ as in Fig. 71. ♂ genitalia (Fig. 537) with relatively longer sacculus and long, apically entire aedeagus. ♀ genitalia (Fig. 767) with corpus bursae at right angles to longitudinal axis of body. Southern parts of Free State and western Cape Province .... 5. *griseobrunnea* sp. n., p. 65
- 9(6) ♀ genitalia (Figs 769, 770) with bursa copulatrix arranged at right angles with longitudinal axis of abdomen. ♂ genitalia, where known, as in Fig. 540 ..... 10

- ♀ genitalia, where known (Fig. 768), with bursa copulatrix in normal position. ♂ genitalia (Figs 539, 541, 542) not as above ..... 11
- 10(9) Moths light ochre, with relatively short wings and well developed costal marks (Figs 75, 76). ♂ genitalia (Fig. 540) with truncated saccus and basally cleft aedeagus. ♀ genitalia (Fig. 769) lacking bulla seminalis. South Africa (Transvaal and Free State); Swaziland, Botswana, Namibia, Zimbabwe; Kenya ..... 8. *persubtilis* sp. n., p. 67
- ♀ moth large, with well developed dark dusting (Fig. 77). ♂ unknown. ♀ genitalia (Fig. 770) with bursa copulatrix somewhat larger, exhibiting well developed bulla seminalis. Kenya ..... 9. *bullifera* sp. n., p. 68
- 11(9) Adult (Figs 73, 74) pale ochreous yellow, with relatively long wings. ♂ genitalia (Fig. 539) with long, gradually tapering uncus and basally cleft aedeagus. ♀ genitalia (Fig. 768) with short and rounded bursa copulatrix; sterigma as illustrated. Transvaal, Namibia, Botswana, Zimbabwe ..... 7. *flava* sp. n., p. 66
- Adults (Figs 78, 79) darker, with relatively shorter wings. ♂ genitalia (Figs 541, 542) with shorter, abruptly tapering uncus and aedeagus not cleft basally. ♀ unknown. KwaZulu-Natal and Cape Province ..... 12
- 12(11) Larger (fw length 10 mm), more vividly ochreous species (Fig. 78). ♂ genitalia (Fig. 541) with rather strongly curved costa and long sacculus. KwaZulu/Natal ..... 10. *pseudospurcata* sp. n., p. 69
- Smaller (fw length 9–10 mm), more brownish species (Fig. 79). ♂ genitalia (Fig. 542) with scarcely curved costa and slightly shorter sacculus. Cape Province ..... 11. *mackayi* sp. n., p. 69

## Description of species

### 1. *Platypepla spurcata* (Warren, 1897)

Figs 65, 66; 533, 765; 974

*Heterolocha spurcata* Warren, 1897a: 118. Holotype ♀, [South Africa]: Weenen, Natal; IV.118/Heterolocha spurcata Warr. ♀ Type; Rothschild Bequest B.M.1939-1 (BMNH) [examined; abdomen missing].

*Platypepla nudaria* Warren, 1900: 96. Holotype ♂, South Africa: S. Africa [no further data]; VIII.96/

*Platypepla nudaria* Warr. ♂ type; Type; Rothschild Bequest B.M. 1939-1 (BMNH) [examined].

*Epigynopteryx deformis* Warren, 1909: 120. Holotype ♀, [South Africa]: Type; Durban, Natal (G.F. Leigh); Rothschild Bequest B.M.1939-1; *Epigynopteryx deformis* Warr. ♀ type; Geometridae genitalia slide No. 11636 (BMNH) [examined]. *Syn. n.*

*Platypepla spurcata* (Warren); Janse, 1917: 115; 1932: 203.

*Platypepla nudaria* Warren; Janse, 1917: 115 (synonymy); 1932: 203 (as synonym of *spurcata*).

FORE WING LENGTH. 8–10 mm (♂), 9–11 mm (♀).

ADULT (Figs 65, 66). Small and sexually dimorphic, the ♀ being larger, with more strongly falcate fore wings. ♂. Ground colour of wings yellowish, with some buff suffusion, especially along wing margins. Lines greatly reduced and only faint traces discernible; however, position of basal and postmedian on fore wing costa indicated by darkish maculation. Discal spots black, minute. Underside similar but with some coarse, greyish-green irroration. ♀. As male, but with extensive greyish-green irroration. Fore wing with a broad, poorly demarcated basal and postmedian fascia, hind wing with postmedian fascia only. Underside similar, but irroration and fasciae coarser and darker. Vestiture of thorax and abdomen concolorous with wings. Hind tibiae of ♂ swollen, but not strongly so, with a group of long hairs present near tibio-femoral joint. Seta comb on A3 absent.

MALE GENITALIA (Fig. 533). Uncus large, triangular. Gnathos rather weak, cingulate. Tegumen strongly rounded; vinculum ending in long, pointed saccus. Valve: costa and sacculus completely separated. Costa rather short and stout, bearing approximately eight spines on dorsal side and apex. Sacculus greatly elongated and gently recurved, without sclerotizations. Aedeagus very small, fusiform and without cornuti on vesica. Octavals delicate, somewhat t-shaped.

FEMALE GENITALIA (Fig. 765). Papillae anales rounded. Both pairs of apophyses very thin; a. anteriores more than half length of a. posteriores. Sterigma: l. antevaginalis strongly developed, as in figure. Ductus bursae extremely short and membranous. Corpus bursae small, tear-shaped; posterior portion of wall membranous, anterior part spinose.

DIAGNOSIS. In facies, the male of this species resembles males of 7. *Platypepla flava* and 8. *P. persubtilis*, below. However, it is characterized by broader wings and the brown costal mark on the fore wing, which is not clearly demarcated as in the other species.

BIOLOGY. The larva has been reared on *Loranthus quinquenervius* Hochst. (= *Tieghemia quinquenervia* (Hochst.) Balle). Adults have been collected from September to February and in April and June.

DISTRIBUTION (Fig. 974). Southern Africa south of 19°S and east of 25°E (eastern Cape Province, KwaZulu-Natal, including former territory of Transkei, Transvaal; Moçambique; Botswana; Zimbabwe).

MATERIAL. 12♂ (3 dissected, TM genitalia slides No. 985, 11093, 11255) and 15♀ (1 dissected, TM

genitalia slide No. 11212). 18 Pretoria (TM), 9 N.J. Duke collection.

**LOCALITIES.** **South Africa, Cape Province:** [Eastern Cape]: East London (2), Beacon Bay (2), Buffalo Pass (4), Nahoon River/East London (1), Port Elizabeth (1), Hogsback (1), Bonza Bay (1), The Haven (2), Port St. John's (2). **KwaZulu-Natal:** Durban (2). **Transvaal:** [Gauteng]: Roodeplaatdam, Pretoria Distr. (1). [Northern Province]: Warmbaths (1), Limburg, Potgietersrus Distr. (1). [Mpumalanga]: Farm Alfa 448JU, Barberton Distr. (1), Fourteen Streams (1). **Moçambique:** Magude (1). **Zimbabwe:** Murahwa's Hill/Mutare (1), Hillside (2).

## 2. *Platypepla jordani* sp. n.

Figs 67; 534; 974

**TYPE MATERIAL.** Holotype ♂, [Namibia]: Sissekab, N.W. of Otavi, 1300 m, 14 November, 1933; S. W. Africa (Dr. K. Jordan); Geometridae genitalia slide No. 19200 (BMNH).

**ADULT ♂** (Fig. 67). A small and delicate species, but legs appearing sturdy relative to body size. Antennae ciliate. Ground colour of wings pale ochre, slightly paler on hind wings, mixed with a few dark brown scales. Forewings narrow, termen almost straight; basal and postmedian lines present, brown and slightly incurved towards costa, otherwise faint and consisting of somewhat darker ochreous scales (microscope!). Costa irregularly streaked with dark brown. Discal spots minute. Cilia ochreous, tinged with brown. Hind wings with vestigial postmedian line only, even fainter than on forewings; cilia concolorous with wings, tinged with brown near anal angle. Underside similar, pale ochreous, lightly irrorated with brown scales except on inner area of forewings. Vestiture of body concolorous with wings.

**MALE GENITALIA** (Fig. 534). Uncus triangular, finely pointed. Gnathos very weakly sclerotized, with rather large medial element. Tegumen well rounded; vinculum gradually tapering and forming well developed saccus. Valvae: costa tongue-shaped, curved upwards near middle, moderately setose and bearing a group of seven spines a short distance from tip; ventral margin with a single, larger spine. Sacculus recurved, somewhat triangular, longer than costa and sparsely setose along ventral margin. Juxta irregularly trapezoidal. Aedeagus weakly sclerotized, short and pointed apically; vesica lacking cornuti. Octavals absent; posterior margin of segment A8 ventrally with a weakly sclerotized lip bearing a fringe of scale-like setae.

**DIAGNOSIS.** *Platypepla jordani* is the most delicate member of the genus to occur in Namibia. In the male

genitalia, the arrangement of spines on the valvae is characteristic.

**BIOLOGY.** The holotype was collected in November.

**DISTRIBUTION** (Fig. 974). Namibia.

**ETYMOLOGY.** Named after the collector of the unique holotype, Dr Karl Jordan.

## 3. *Platypepla uhlenhuthi* sp. n.

Figs 68; 535

**TYPE MATERIAL.** Holotype ♂, [Ethiopia]: Dire Daoua, Abyssinia, April 1936 (H. Uhlenhuth); Geometridae genitalia slide No. 11639 (BMNH).

**ADULT ♂** (Fig. 68). A delicate but relatively broad-winged species; legs appearing robust relative to body size. Antennae ciliate. Ground colour of wings ochreous, lightly suffused with brown, leaving hind wings paler, and irrorated with some dark brown scales. Forewings with slightly falcate apex; costa irregularly streaked with dark brown. Basal and postmedian lines present but very faint, barely darker than ground colour but with their position marked by a small brownish macula on costa. Discal spots minute. Cilia ochreous, finely tinged with dark brown. Hind wings with vestigial postmedian line only, comparatively best developed near anal angle but not reaching costa. Discal spots minute, as on forewings. Underside ochreous with coarse brown irroration except along inner margin of forewings. Discal spots and lines as on upper side. Vestiture of thorax and abdomen ochreous, mixed with brown scales.

**MALE GENITALIA** (Fig. 535). Uncus narrowly triangular. Gnathos very weakly sclerotized, with large medial element. Tegumen globular; vinculum tapering into a short and stout saccus. Valvae: costa from broad base, narrowing into finger-like process; surface rugose and covered with setae. A group of four strongly sclerotized spines present along outer margin, in addition a single, larger spine arising from base. Sacculus recurved, elongated and setose along inner margin. Juxta crescentic, weakly sclerotized. Aedeagus small, though relatively larger than in other *Platypepla* species, subcylindrical and pointed apically, but not acutely so; vesica without cornuti. Octavals absent but posterior margin of segment A8 ventrally with a semicircular sclerotization, tapering into a fine point.

**DIAGNOSIS.** *Platypepla uhlenhuthi* is the only *Platypepla* species so far recorded from Namibia. The configuration of spines on the valvae is characteristic.

**BIOLOGY.** The holotype was collected in April.

**ETYMOLOGY.** Named after the collector of the unique holotype, H. Uhlenhuth.

#### 4. *Platypepla macilenta* sp. n.

Figs 69, 70; 536, 76, 975

TYPE MATERIAL. Holotype ♂, [South Africa] [Eastern Cape]; Transkei, Umtata, 24.12.[19]89 (N.J. Duke); TM Lep[ido]ptera Het[erocera] Genitalia slide No. 11237 (TM). Paratypes (13♂, 2♀). [South Africa] [Eastern Cape]; 8♂, *ibidem*; 4♂, 1♀, *ibidem*, dated 2.I.1989 (TM genitalia slide No. 11238) (♀); 1♀, Port Elizabeth, 9.II.[19]40 (Gowan C. Clark) [bred specimen with exuviae]. **KwaZulu-Natal:** 1♂, Nat[al], Muden, 3.-6.XII.1954 (H. Cookson). (TM).

FORE WING LENGTH. 9–10 mm (♂), 10–11 mm (♀).

ADULT (Figs 69, 70). Very small. Sexes dimorphic, the ♀ being somewhat larger, with more strongly falcate fore wings. ♂. Fore wing slightly falcate, hind wing rounded. Ground colour of wings ochreous yellow, fore wings suffused with brown and with some dark striations along costa. On hind wing, dark suffusion and striation confined to inner margin. Discal spots black, minute. Lines greatly reduced on fore wing, but their position indicated by three dark marks on costa. Underside ochreous yellow with coarse dark dusting on hind wing and along costa of fore wing. Discal spots present. ♀. Ochreous yellow with intense coarse irroration across wings. Basal and postmedian line bold, but not well defined on fore wing; on hind wing, only postmedian present, also bold but not reaching termen. Discal spots as in ♂. Underside similar, but dark irroration even heavier. Vestiture of thorax and abdomen ochreous, mixed with darker scales in both sexes. Hind tibia of male not modified; setal comb on A3 absent.

MALE GENITALIA (Fig. 536). Uncus attenuated, from broad base; gnathos band-like, as described for the genus. Costa of valve narrow, gently curved. Arm from base of costa with simple tip. Sacculus large. Juxta approximately semicircular. Aedeagus without cornuti, small relative to size of genitalia. Tip of aedeagus bifurcate, with dorsal prong much longer. Octavals very simple, consisting of slightly sclerotized, elliptical lip, bearing a row of short hairs.

FEMALE GENITALIA (Fig. 766). Papillae anales relatively large, rounded. Apophyses not stout but well sclerotized, a. anteriores about two-thirds length of a. posteriores. Sterigma: l. antevaginalis large, trapezoidal. Bursa copulatrix small and rounded, with very short ductus bursae. Anterior half of corpus bursae densely spinose.

EARLY STAGES. Pupa. See description given in generic diagnosis.

DIAGNOSIS. The degree of dark dusting in this species appears intermediate between the similar, paler

*Platypepla spurcata*, above, 7. *Platypepla flava* and 8. *P. persubtilis*, and the darker 5. *P. griseobrunnea* and is apparently subject to little variation. In the male genitalia, the best characters for recognizing this species are provided by the apically cleft aedeagus and the comparatively short sacculus.

BIOLOGY. Restricted to subtropical lowland forest along the Transkei and KwaZulu-Natal coast. Adults have been collected in December and January.

DISTRIBUTION (Fig. 978). Southern Africa, recorded from KwaZulu-Natal in South Africa, as well as the Eastern Cape (Transkei).

FURTHER MATERIAL. 1♂ and 1♀. I Pretoria (TM), 1 N.J. Duke collection.

LOCALITIES. **South Africa, Eastern Cape:** Beacon Bay (1), Port Elisabeth (1).

ETYMOLOGY. From Latin *macilentis* (-a, -um), small.

#### 5. *Platypepla griseobrunnea* sp. n.

Figs 71; 537, 767, 976

TYPE MATERIAL. Holotype ♂, **South Africa, Cape Province:** [Northern Cape]; Nababiep, C[ape] P[rovince], 13.–14.VIII.1961 (Vári & van Son); TM Lep[ido]ptera Het[erocera] genitalia slide No. 11094 (TM). Paratypes (22♂, 2♀). **South Africa, Cape Province:** [Northern Cape]; 4♂, same data as holotype; 3♂, *ibidem*, dated 30.VIII.–2.IX.1962 (Vári & Goode); 1♂, 2♀, P.K. Le Roux Dam, Van der Kloof, C[ape] P[rovince], dated 19.–25.Oct[ober] 1970 (2♀, 1 dissected, TM Lep. Heter. Genitalia slide No. 11281) and 15.–19.III.1971 (Snyman & Jones) (♂); 5♂, Springbok, 20.Sept[ember] 1970 (Snyman & Potgieter); 1♂, Brakfontein, Richtersveld, 10.XI.1933 (G. van Son), Geometridae genitalia slide No. 19201 (BMNH). [**Western Cape:**] 2♂, Jonkershoek, 22.–23.X.1965 (L. Vári); 1♂, Seweweekspruit, 4.–6.XII.1968 (Potgieter & Jones); 1♂, *ibidem* (as Seven Weeks Poort), 20.X.[19]82 (N.J. Duke). **Free State:** 1♂, Zastrand, O[range] F[ree] S[tate], Farm Maghaleen, 2.–7.XII.1969 (J.H. Potgieter, c[um] s[uis]). [**Namibia:**] 1♂, Hoffnung, E. of Windhoek, 1850 m, 5 January, 1934; S.W. Africa (Dr. K. Jordan); 2♂, *ibidem*, dated 10 January, 1934. (BMNH, TM).

FORE WING LENGTH. 9–12 mm (♂), 10–11 mm (♀).

ADULT (Fig. 71). ♂. Very small. Ground colour of wings ochreous to greyish ochre, suffused with greyish brown, particularly on fore wing, and with additional dark irroration. Lines entirely absent on hind wing. On fore wing, median absent and basal and postmedian faint, but their position marked by small dark maculae

on costa. Discal spots black, minute. Underside with discal spots present but without further markings; irroration coarser. Vestiture of thorax and abdomen concolorous with wings. ♀. Wings broader than in ♂. Both pairs of wings evenly and finely dusted with greyish-brown. On forewings, basal and postmedian lines well developed for the genus; on hind wings, postmedian line only present. Hind tibia of ♂ not modified. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 537). Uncus and gnathos as described for the genus. Costa of valve gently recurved. Arm from base of costa and sacculus with simple apex. Sacculus moderately broad, longer than costa. Aedeagus pointed, not cleft anteriorly; vesica lacking cornuti. Octavals simple, as in figure.

**FEMALE GENITALIA** (Fig. 767). Papillae anales fairly large for the size of the abdomen, tips rounded. Apophyses slender but not thin, a. anteriores between half and two-thirds length of a. posteriores. Sterigma somewhat heart-shaped; expansive but not well defined. Bursa copulatrix small and pear-shaped with very delicate and short ductus, anterior half of bursal wall finely spinose.

**EARLY STAGES.** Unknown, but see under Biology.

**DIAGNOSIS.** *Platypepla griseobrunnea* is the darkest member of the genus. Together with the preceding species, *P. macilenta*, it has the arm from base of costa simple, rather than with a bifurcate tip. *P. griseobrunnea* may be recognized by its narrower, triangular rather than semicircular sacculus and the simple aedeagus which is not cleft apically.

**BIOLOGY.** The species occurs in fairly arid habitats; adults have been collected August–October, in December, and in March. According to label data, the larva feeds on *Loranthus elegans* Cham. & Schlechtendal (= *Moquinella rubra* (Spreng. f.) Balle).

**DISTRIBUTION** (Fig. 976). South Africa, where the species is found in the southern parts of the Free State and the Western and Northern Cape (a single record exists from the Eastern Cape); Namibia.

**FURTHER MATERIAL.** 2♂. 2 Pretoria (TM).

**LOCALITIES.** **South Africa, Cape Province:** [Northern Cape]: P.K. Le Roux Dam, Van der Kloof (1). [Eastern Cape]: Commadaga (1).

**ETYMOLOGY.** From Latin *griseus* (-a, -um), grey, and *brunneus* (-a, -um), brown; on account of the coloration.

## 6. *Platypepla loranthiphaga* sp. n.

Figs 72; 538; 975

**TYPE MATERIAL.** Holotype ♂, [Namibia]: Abac-

haus, S[outh] W[est] A[frica], April [19]44 (G. Hobohm); A. 26.II.44 aus Raupe von gelb blühender *Lorantus* Art [sic, in Hobohm's hand]; TM Lep[ido]ptera Het[ero]cera genitalia slide No. 11095 (TM). Paratype (1♂). [Namibia]: *ibidem* (TM). See Remarks.

**FORE WING LENGTH.** 10 mm (♂).

**ADULT ♂** (Fig. 72). Small. Ground colour of wings vividly orange-ochre, with greyish brown dusting confined to fore wing and inner margin of hind wing. Lines absent on hind wing; on fore wing, yellowish basal and postmedian present but weak, angled; their position marked by conspicuous black maculae on costa. Discal spots black, minute. Apex of fore wing with faint blackish markings. Underside without lines but with discal spots present. Fore wing orange, with buff streak along costa; hind wing buff with fine brown striation. Vestiture of thorax and abdomen concolorous with wings. Hind tibia of ♂ not modified. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 538). Uncus and gnathos as described for the genus. Costa of valve curved near base. Sclerotized arm bifurcate. Sacculus moderately broad, triangular and as long as costa. Aedeagus pointed, not cleft anteriorly; vesica without cornuti. Octavals simple, consisting of a shallow, sclerotized lip.

**DIAGNOSIS.** This species is characterized by its orange-ochre coloration and the well developed blackish maculae on the fore wing costa. There is some similarity to males of 4. *P. macilenta* and 5. *griseobrunnea*, but in these species the sclerotized arm from the base of the costa has a simple tip (bifurcate in *loranthiphaga*). The female of *P. loranthiphaga* is unknown.

**BIOLOGY.** The species is probably associated with savanna. According to label data, the larva feeds on *Loranthus*; in captivity, adults emerged in February.

**DISTRIBUTION** (Fig. 975). Known from a single locality in north central Namibia.

**ETYMOLOGY.** From *Loranthus*, the foodplant of the larva, and Greek φαγέιν, to eat.

**REMARKS.** As Hobohm's handwritten notes on both type specimens give 26 February 1944 as emergence date of the moth, I assume that this, not the later date on the printed label, is correct.

## 7. *Platypepla flava* sp. n.

Figs 73, 74; 539, 768; 976

**TYPE MATERIAL.** Holotype ♂, [Namibia]: Valencia Farm, Rehoboth Distr[ict], S[outh] W[est] A[frica], 7.–

17.V.1965 (J.H. Potgieter); TM Lep[ido]ptera Het[erocera] genitalia slide No. 11239 (TM). Paratypes (7♂, 5♀). [Namibia]: 3♂, 2♀, same data as holotype, TM Lep. Het. genitalia slide No. 11213 (♀); 1♂, 1♀, Katima Mulilo, E[ast] Caprivi, 20.–28.X.1970 (A. Strydom); TM Lep. Het. genitalia slides No. 11235 (♂), 11236 (♀); 1♂, S[outh] W[est] Africa, Etosha Pan, Okaukuejo, 19.11S 15.55E; 25.12.1974; E[ndrödy]-Y[ounga]: 521, UV light collection, leg. Endrödy-Younga; 1♂, Farm Djab, S[outh] W[est] A[frica], Rehoboth Distr[ict], 7.V.1959 (L. Vári); 1♂, Abachaus, S[outh] W[est] A[frica], Dec[ember] 1944 (G. Hobohm). [South Africa, Transvaal]: [Northern Province]: T[rans]v[aal], Nylstroom, 13.I.1963 (D.W. Rorke); TM Lep. Het. genitalia slide No. 11254; 1♀, *ibidem*, dated 21.XII.[19]25 (A.J.T. Janse). (TM).

FORE WING LENGTH. 9–12 mm (♂), 11–12 mm (♀).

**ADULT** (Figs 73, 74). Very small. Sexes dimorphic, ♀ with broader, more strongly falcate fore wings. ♂. Ground colour of wings yellowish ochre, with light brown suffusion on fore wing; faint additional dark dusting present along costa of fore wing and inner margin of hind wing. Discal spots blackish, minute. Hind wing without lines; on fore wing, basal and postmedian very faint, oblique, their position marked by small dark maculae on costa. Two very short blackish streaks on apex of fore wing. Underside ochreous with faint orange tinge on fore wing; hind wing and costal area of fore wing with fine dark dusting. ♀. Wings pale yellowish ochre with irregular, coarse, greenish-brown irroration. Discal spots blackish, minute. Lines practically reduced; postmedian on hind wing indicated by a streak of dark dusting, reaching from inner margin to beyond cell. Fore wing with a large inner and a smaller outer mark where basal and postmedian line join costa. A dark, irregular spot of varying size slightly below level of cell present on fore wing. Apex of fore wing with a short, fine black streak. Underside similar, with coarser irroration along costa of fore wing and on hind wing. Hind tibia of ♂ not modified; setal comb on A3 absent. *Variation.* One melanistic female from Zimbabwe is known, in which the ground colour is replaced by dark greyish-brown.

**MALE GENITALIA** (Fig. 539). Uncus and gnathos as described for the genus. Costa of valve only slightly curved. Sclerotized arm from base of costa bifurcate. Sacculus large, broadly triangular and longer than costa. Aedeagus short and stout, acutely pointed and cleft anteriorly; vesica without cornuti. Octavals consisting of a narrow, sclerotized lip, bearing a fringe of setae.

**FEMALE GENITALIA** (Fig. 768). Papillae anales large. Apophyses thin; a. anteriores about half length of a. posteriores. Sterigma: 1. antevaginalis weakly sclerotized, somewhat w-shaped. Antrum short and squat, with small operculum. Bursa copulatrix very

small, rounded. Ductus bursae anterior of antrum very short. Corpus bursae with anterior two-thirds of wall spinose.

**DIAGNOSIS.** This species resembles *Platypepla persubtilis* below rather closely, but is larger, with slightly more elongate wings. *P. griseobrunnea* and *P. macilenta*, while similar in size, are markedly darker. The differences in the genitalia are evident from the illustrations (compare Figs 539, 540 and 768, 769).

**BIOLOGY.** The species prefers drier types of savanna. The larva probably feeds on species of *Loranthus* *sensu lato* (label data). Adults have been collected in January–February, May, October and December.

**DISTRIBUTION** (Fig. 976). Occurring across southern Africa, with records from South Africa (Northern Province), Namibia, Botswana and Zimbabwe.

**FURTHER MATERIAL.** 5♀ (1 dissected, genitalia slide L 695 (NMBZ)). 5 Bulawayo (NMBZ).

**LOCALITIES.** [Zimbabwe]: (S. Rhodesia), Khami/Bulawayo (2), Bulawayo (1), Riverside/Bulawayo (1). **Botswana:** Sepopa, Ngamiland (1).

**ETYMOLOGY.** From Latin *flavus* (-a, -um), yellow; on account of the colour of the moth.

## 8. *Platypepla persubtilis* sp. n.

Figs 75, 76; 540, 769; 975

**TYPE MATERIAL.** Holotype ♂, [South Africa, Transvaal]: [Mpumalanga]: Skukuza, 23.III.1952 (Janse & Vári); TM Lep[ido]ptera Het[erocera] genitalia slide No. 11253 (TM). Paratypes (20♂, 2♀). [South Africa, Transvaal]: [Mpumalanga]: 1♂, same data as holotype; 1♂, *ibidem*, dated 2.IV.1952 (L. Vári). [North-West]: 1♂, Rustenburg, 24.XI.1926 (W. Impey). [Gauteng]: 1♂, Witkoppen, 5.I.[19]75; ex collection J.C. Nicholson donated January 1976. [Northern Province]: 1♂, Naauwpoort, P[ieters]b[urg], 27.II.[19]27 (G. v. Son); *Platypepla nudaria* Warr. ♂ [misidentification]; Geometridae genitalia slide No. 19199 (BMNH). [KwaZulu-Natal]: Weenen, X.1926 (H.P. Thomasset); Presented by Imp[erial] Bur[eau] [of] Ent[omology], Brit[ish] Mus[eum] 1927–387.; Geometridae genitalia slide No. 19202 (BMNH). [Free State]: 1♂, 1♀, Bloemfontein, 5.I.1923 (H.E. Irving); TM Lep. Het. genitalia slide No. 11214 (♂); 2♂, 1♀, *ibidem*, with addition 'Bred', dated 13.XII.1922 (♂), 14.XII.1922 (♂), 31.I.1923 (♀); TM Lep. Het. genitalia slide No. 11215 (♀). **Swaziland:** 1♂, Mpisi, 26.I.1991 (N.J. Duke). [Namibia]: 3♂, Hoffnung, E. of Windhoek, 1850 m, 9 October, 1933; S.W. Africa (Dr. K. Jordan); 1♂ *ibidem*, dated 23 October; 1♂, *ibidem*, dated 5 January, 1934; 2♂, Otjoscogombe, Waterberg, 1600

m, 5 November, 1933; S.W. Africa (Dr. K. Jordan); 1♂, Naukluft Mts., 1300–1500 m, 7–10 December, 1933; S.W. Africa (Dr. K. Jordan). [Zimbabwe]: 1♂, S[outhern] Rhodesia, Christon Bank, 31.XII.1975 (A.J. Duke). (BMNH, TM).

FORE WING LENGTH. 8–10 mm (♂), 9–10 mm (♀).

ADULT (Figs 75, 76). Very small. Sexes faintly dimorphic: ♀ slightly larger, with more strongly falcate fore wings. ♂. Ground colour of wings pale yellowish ochre with fine dark dusting along costa of fore wing and on inner margin of hind wing. In some specimens, fore wings with a faint darker ochreous suffusion. Discal spots black, minute. Lines entirely reduced on hind wing. On fore wing, position of basal and postmedian indicated by a larger inner and a smaller outer dark spot, lines proper absent or extremely faint. Apex of fore wing with a very thin black line. Underside similar; interior of fore wing with an orange tinge. Coarse brown striation present on hind wing and along costa of fore wing. ♀. Slightly darker than ♂, with irroration on both sides of wings more intense. Lines absent in one and weak in the other known ♀. The dark costal spots weaker than in ♂. Postmedian area of fore wing with a greyish, not well defined spot on level of cell. Underside similar, with irroration coarser. Hind tibia of ♂ not modified. Setal comb on A3 absent.

MALE GENITALIA (Fig. 540). Uncus and gnathos as described for the genus. Costa of valve curved near base, setose. Sacculus relatively narrow, triangular. Sclerotized arm from base of costa bifurcate. Saccus ending in a squarish tip. Aedeagus acutely pointed and cleft anteriorly; vesica without cornuti. Octavals taking the shape of a very narrow, sclerotized ridge, bearing a fringe of short hairs.

FEMALE GENITALIA (Fig. 769). Papillae anales rounded. Both pairs of apophyses thin but well sclerotized, a. anteriores about half length of a. posteriores. Sterigma extensive, though not well chitinized. Lamella postvaginalis with a medial, channel-like structure of unknown function. Operculum present, well sclerotized; antrum apparently absent. Bursa copulatrix roughly pyriform; anterior two-thirds of bursa wall spinose. Bursa situated at a 90° angle to longitudinal axis of abdomen.

DIAGNOSIS. In facies, this species resembles 7. *P. flava* most closely. However, it is smaller, with shorter, broader wings and the inner dark mark on the fore wing costa is usually prominently developed in the male. In the male genitalia, the sacculus is slightly shorter in *persubtilis* and the species has the tip of the saccus truncated, not rounded. The female genitalia differ strongly (compare Figs 768 and 769).

BIOLOGY. The species is rather widely distributed in

savanna habitats of varying aridity. Adults have been collected from November–January and in March–April.

DISTRIBUTION (Fig. 975). In South Africa locally in the former Transvaal, KwaZulu-Natal and the Free State. Further recorded from Swaziland, Botswana, Namibia, Zimbabwe and Kenya.

FURTHER MATERIAL. 17♂ (2 dissected, genitalia slide M. Krüger No. 48 (NMKE); Geometridae genitalia slide No. 11637 (BMNH)) and 1♀. 1 London (BMNH), 2 Nairobi (NMKE), 11 Bulawayo (NMBZ), 2 Windhoek (SMWN), 1 Pretoria (TM), 1 N.J. Duke collection.

LOCALITIES. **South Africa, Transvaal:** [Northern Province]: Mosdene/Naboomspruit (1). **Botswana:** Four River Camp, Okavango (2), Mohembo-Shakawe, W. Ngamiland (1), 13 m NW. Kanye, on Kang Road (1). **Zimbabwe:** Bulawayo (1), Khami/Bulawayo (3), Chirundu Bridge, Zambezi (1), Victoria Falls (1). **Namibia:** Zaris Farm (1), Okahandja (1), Tsumeb (1), Ondangua, Ovamboland (1), Hoffnung, E. of Windhoek (1). **Kenya:** Nakuru (1), Ngong/Nairobi (1).

ETYMOLOGY. From Latin *persubtilis* (-e), very slight, in reference to its close affinity to *P. flava*.

#### 9. *Platypepla bullifera* sp. n.

Figs 77; 770

TYPE MATERIAL. Holotype ♀, [Kenya]: Langata/Nairobi, June 1961 (D. Minter); genitalia slide M. Krüger No. 50 (NMKE). Paratype (1♀). **Kenya:** Molo, Kenya, Nov[ember] 1961 (J.G. Williams), ex *Loranthus* (NMKE).

FORE WING LENGTH. 11–12 mm (♀).

ADULT ♀ (Fig. 77). Large. Fore wings scalloped below the rounded apex. Ground colour of wings ochreous with some brownish suffusion along fore wing costa and termen and near anal angle of hind wing, and with some uneven, greyish-brown suffusion, lending the wings a dirtyish appearance. A round, greyish-brown spot present in postmedian area of forewing. Lines rudimentary, more like poorly defined fasciae; fore wing with incomplete basal and postmedian, hind wing with postmedian line only. Discal spots blackish, minute. Underside similar but ground colour more vivid, with a tinge of orange, and markings darker brown. Vestiture of thorax and abdomen concolorous with wings.

FEMALE GENITALIA (Fig. 770). Papillae anales pointed. Both pairs of apophyses fairly stout, a. anteriores more than two-thirds length of a. posteriores. Sterigma greatly developed, somewhat heart-shaped; a long median channel-like structure of unknown func-

tion present. Bursa copulatrix small, corpus with finely spinose base; membranous posterior part with small bulla seminalis. Corpus bursae arranged at a 90° angle to longitudinal axis of abdomen.

**DIAGNOSIS.** In external appearance, the moth very closely resembles females of *P. spurcata*. However, its genitalia clearly identify it as belonging to *Platypepla* and further indicate its close relationship with 8. *P. persubtilis*, which, however, is much smaller and lacks a bulla seminalis.

**BIOLOGY.** According to label data, the larva feeds on *Loranthus* sp. (*sensu lato*) (Loranthaceae); adults emerged/have been collected in June and November.

**DISTRIBUTION.** Kenya.

**ETYMOLOGY.** From Latin *bulla* (-ae), a pouch, and *fero*, to carry; on account of the presence of a bulla seminalis in the female genitalia.

#### 10. *Platypepla pseudospurcata* sp. n.

Figs 78; 541; 976

**TYPE MATERIAL.** Holotype ♂, [South Africa, KwaZulu-Natal]: Muden, Natal, Dec[ember] 1953 (H. Cookson); *Platypepla spurcata* Warren, det. D.S. Fletcher 1960 [misidentification]; genitalia slide M. Krüger No. 49 (NMKE).

**FORE WING LENGTH.** 10 mm (♂ holotype).

**ADULT ♂** (Fig. 78). A medium-sized *Platypepla*. Apex of fore wing very slightly falcate. Ground colour of wings yellowish ochre, fore wing with faint brownish suffusion. No lines present on hind wing; fore wing with pale ochreous, inconspicuous basal and postmedian, angled below costa; their position on costa indicated by a dark mark. Discal spots blackish, minute. Underside yellowish ochre with some very fine greyish dusting on hind wing. Discal spots as on upperside. Vestiture of thorax and abdomen concolorous with wings. Hind tibia of ♂ not modified. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 541). Uncus strongly developed, with finely pointed tip. Gnathos typical for the genus. Costa of valve strongly curved near base, gently dilated apically; sclerotized arm from base curved; bifurcate. Sacculus prominently developed, broadly rounded and slightly longer than costa. Saccus somewhat truncated. Aedeagus of typical *Platypepla* shape, anterior end not cleft; vesica lacking cornuti. Octavals taking the shape of a gently curved, narrow, sclerotized lip.

**DIAGNOSIS.** In facies, this species is very much like 7. *P. flava*, above, although the wings of the ♂ holotype

of *pseudospurcata* are slightly more elongated, with a more convex termen. In the male genitalia, the two species can be separated by differences in the form of the uncus and the more strongly rounded sacculus in *pseudospurcata*. The new species also bears some resemblance to *Platypepla spurcata*, above.

**BIOLOGY.** The locality suggests an association with subtropical lowland forest; the unique holotype was collected in December.

**DISTRIBUTION** (Fig. 976). South Africa, known from a single locality in KwaZulu-Natal province.

**ETYMOLOGY.** From Greek ψεῦδος, false, and *Platypepla spurcata*; in allusion to the similarity of the adults.

#### 11. *Platypepla mackayi* sp. n.

Figs 79; 542; 975

**TYPE MATERIAL.** Holotype ♂, South Africa, Cape Province: [Eastern Cape]: Kirkwood, C[ape] P[rovince], S[outh] Africa, Dec[ember] 1966 (D. MacKay); genitalia slide M. Krüger No. 47 (NMKE). Paratype (1♂). **South Africa:** same data as holotype (NMKE).

**FORE WING LENGTH.** 9–10 mm (♂).

**ADULT ♂** (Fig. 79). A small species with broad, very slightly falcate forewings. Ground colour ochreous, fore wings suffused with light brown. Basal and postmedian line on fore wing scarcely visible but their position on costa indicated by rather faint brown marks. Hind wing devoid of lines. Discal spots blackish, minute. Underside similar, with some faint greyish-brown dusting. Thorax and abdomen concolorous with wings. Hind tibia of ♂ not modified. Seta comb on A3 absent.

**MALE GENITALIA** (Fig. 542). Uncus comparatively stout and massive. Gnathos as described for the genus. Costa of valve straight and rather short; sacculus strongly developed, rounded. Arm from base of costa bifurcate. Saccus forming a broadly rounded tip. Aedeagus of normal shape, somewhat curved; vesica lacking cornuti. Octavals taking the shape of a very narrow sclerotized lip.

**DIAGNOSIS.** Because of the brown suffusion on the fore wing, *Platypepla mackayi* resembles *P. griseobrunnea* and *P. macilenta*, but is smaller, with a shorter and stouter uncus. The female genitalia are unknown.

**BIOLOGY.** Unknown. The two adults known have been collected in December.

**DISTRIBUTION** (Fig. 975). Known from a single locality in the eastern Cape Province of South Africa.

ETYMOLOGY. Named after the collector of the type series, D. MacKay.

## 12. *Platypepla schistopenis* sp. n.

Figs 80; 543

TYPE MATERIAL. Holotype ♂, [Kenya]: Nairobi, April [19]58 (R. Carcasson); genitalia slide M. Krüger No. 46 (NMKE). Paratype (1♂). [Kenya]: Nakuru, bred xii.1937 (A. Townsend)/3021 (NMKE).

FORE WING LENGTH. 9 mm (♂).

ADULT ♂ (Fig. 80). Small. Costa of fore wing slightly convex, apex pointed. Ground colour of wings ochreous, fore wings lightly suffused with leather brown and with some additional fine brown dusting; hind wings with brown suffusion along inner margin. Fore wing with straight median and strongly angled postmedian line, both very fine. Two brown maculae present where lines meet fore wing costa. Hind wing with barely visible remnants of postmedian only. Discal spots absent. Underside paler, yellowish ochre, with some fine brown dusting on hind wing and along costa of fore wing. Postmedian line on hind wing present, very fine. Vestiture of thorax and abdomen ochreous brown. Hind tibia not modified. Setal comb on A3 absent.

MALE GENITALIA (Fig. 543). General aspect compact. Uncus triangular, pointed. Gnathos cingulate, large. Costa of valve short and rather massive, subtriangular. Sacculus large, somewhat angular, with strongly developed inner margin. A long, grooved, nail-like process arising from base of sacculus. Saccus broadly rounded. Aedeagus cleft near middle, tapering anteriorly; vesica without cornuti. Octavals absent, but distal margin of A8 with slightly heavier sclerotization than surrounding area.

DIAGNOSIS. *Platypepla schistopenis* resembles most *Platypepla* species in facies but can immediately be recognized by its characteristic genital structure. This and *P. bullifera* are the only *Platypepla* species recorded from Kenya so far.

BIOLOGY. Unknown. Although one of two known specimens was reared, no information concerning the larval foodplant is available. The adults were collected or emerged in April and December, respectively.

DISTRIBUTION. Kenya.

ETYMOLOGY. From Greek σχιστός, cleft, split and Latin *penis*, the intromittent organ: on account of the cleft aedeagus.

## 13. *Platypepla curvigliadiata* sp. n.

Figs 81; 544

TYPE MATERIAL. Holotype ♂, Nigeria: Kajela,

Kogin Kano Game reserve, April 1974 (H. Politzar); genitalia slide M. Krüger No. 45 (NMKE). Paratypes (2♂). Nigeria: same data as holotype, one specimen with handwritten label, 'Kajela, 18.4.74' (NMKE).

FORE WING LENGTH. 9–10 mm (♂).

ADULT ♂ (Fig. 81). Small. Fore wings elongated, costa straight basally, then curving towards the slightly falcate apex. Ground colour of wings ochreous, fore wings somewhat darker due to light brown suffusion. Fore wing with thin, slightly oblique brown median and postmedian line running parallel for most of their course; hind wing without lines. Discal spots present but very small. Underside similar, but fore wing without brownish suffusion and hind wing with fine greyish dusting. Vestiture of thorax and abdomen concolorous with wings. Hind tibia of ♂ not modified. Setal comb on A3 absent.

MALE GENITALIA (Fig. 544). Uncus triangular, large. Gnathos reduced. Tegumen and vinculum forming a near-spherical, well sclerotized capsule. Costa of valve bar-shaped, straight and with a short and massive ventral process arising from base. Sacculus of similar length as costa, scooped, terminating in a fine point. Saccus broad, ending in a small, short tip. Aedeagus short and cone-shaped, heavily chitinized. Vesica with a single, very large nail-like cornutus. Octavals faint, extending over most of distal margin of A8, broadly arcuate.

DIAGNOSIS. The structure of the male genitalia differs clearly from other *Platypepla* species and permits ready identification.

BIOLOGY. Unknown. The three adults known have been collected in April.

DISTRIBUTION. Nigeria.

ETYMOLOGY. From Latin *curvi-*, curved, bent and *gladius* (-i), a sword: for the characteristic sword-like cornutus on the vesica.

## B. Other Macariini

DIAGNOSIS. It is not clear if the members of this group, which comprises most species of Macariini, form a monophylum. However, the species concerned share the following possible apomorphies: (i) incomplete separation of costa and sacculus in the male genitalia and (ii) the presence of an antrum bearing two vertical and slightly elliptical sclerotized bands. In the Neotropical *Semiothisa* Hübner and the Oriental *Iridoplecta* Warren (not illustrated) the valve appears completely separated due to secondary reduction in width of costa and/or sacculus. Similarly, the antrum may become strongly modified in the more derived genera, making it difficult to recognise the hogue of the vertical bands.

**DESCRIPTION.** See remarks under Diagnosis and Description of tribe, p. 000.

**HEAD.** As for tribe. Antennae of ♂ never plumose (i.e., bipectinate with very long and slender pectinations). Among the genera studied, transversely elongated condition of chaetosemata lost in *Lampadopteryx* Warren, *Iridoplecta* Warren, *Hypephyra* Butler and *Malgassothiisa* Herbuleot. Protuberances on frons present in all species of *Cheloteplrina* gen. n. and some primitive species-groups of *Chiasmia*.

**THORAX.** As for tribe. **Wings:** broad; costa of fore wing usually slightly convex; apex mostly rounded, occasionally notched. Hind wing of many, but not all genera with a small 'tail'. Fovea present in most genera; a patch of raised scales indicating position of absent fovea in *Chiasmia nubilata* and *extrusilinea*.

**ABDOMEN.** Small and slender to fairly robust. Tip of abdomen without hair pencil. Setal comb on sternum A3 present in many species; a transverse patch of scales as in *Milocera* absent. Octavals present or absent, displaying great variability in shape and size; occasionally parts of surface scobinate (Fig. 578) or hairy (Fig. 617). Tympanal organs mostly smaller than in the *Platypepla* group of genera; cavi tympani rounded and well sclerotized; a tympanic lacinia frequently present.

**MALE GENITALIA.** Uncus broadly triangular or dome-shaped; surface evenly setose or setae concentrated in two ventral groups near base of uncus. In many derived genera some setae transformed to form a pair (rarely three or four) of sclerotized 'horns'. Gnathos cingulate or, more commonly, deeply emarginate. Valve cleft but not as deeply as in the *Platypepla* group (Fig. 19); rarely with a second cleft, leading to a trilobate appearance (Fig. 744). Tegumen and vinculum rounded, somewhat elliptical. Saccus usually broadly rounded, rarely extended to form a prominent tip (Fig. 578). Aedeagus medium-sized to large; vesica usually with cornuti, microcornuti or striations.

**FEMALE GENITALIA.** Papillae anales and apophyses as described for tribe; apophyses posteriores rarely with small lateral dilatations (Fig. 841). Sterigma mostly present, in structure ranging from simple (Fig. 807) to highly complex (Fig. 912). In many species, lamella postvaginalis forming discrete paired lateral sclerotizations next to antrum. Antrum present, exhibiting considerable variation in size and shape. Ductus bursae membranous and usually ribbed; rarely entirely replaced by antrum (Fig. 784). Bursa copulatrix usually pear-shaped or elongated; bursa wall mostly membranous, rarely tough and leathery (Fig. 784) or covered locally with small denticles (Fig. 903). Signum small to large and stellate, occasionally absent.

## 1. Genus *CHELOTEPHRINA* gen. n.

Type species: *Tephrina crypsispila* Fletcher, 1958b: 130, by present designation.

**GENERAL APPEARANCE** (Figs 82–84). Fairly large and robust macariines with broad wings; termen of hind wing angled at M3. Wings greyish-brown with simple line pattern and some dark maculation; fore wing with a rhomboidal patch of varying coloration from the oblique postmedian line to costa. Underside unicolorous with more or less complete rows of dark maculae in postmedian area. Head: antennae of ♂ serrated, each serration with small tuft of ciliae; of ♀, ciliate. Frons with a short, cylindrical projection. Labial palpi short and massive with small terminal joint; approximately diameter of eyes. Proboscis well developed. Legs: hind tibia of ♂ swollen, with hair-pencil hidden in groove on inner side.

**VENATION** (Fig. 14). Fore wing: Sc connected to R1+2 by a short bar near end of cell; R3+4 and R5 stalked, stalk from near end of cell. 1A+2A coincident. Fovea absent. Hind wing: Sc+R1 and Rs approximated for some distance but not fused. Vein 2A weak and scarcely reaching beyond cell.

**MALE GENITALIA** (Figs 545, 546). The genus is characterized by the possession of several autapomorphies, most notably the square, apically trilobate uncus and claw-like shape of the valve. Sacculus cleft. Gnathos apparently derived from the cingulate type, but differs in having the central portion small and acutely pointed. For a detailed description see below.

**FEMALE GENITALIA** (Fig. 771). These are characterized by the structure of the antrum, which is particular to this genus, lacking the vertical sclerotized bands present in *Isturgia*, *Chiasmia* and other derived macariines. For a detailed description see below.

**DISTRIBUTION.** Disjunct. The type species occurs from west to east Africa, while the second member of the genus is restricted to South Africa and Zimbabwe.

**ETYMOLOGY.** From Greek χηλή, ή a crab's claw, and *Tephrina*; in allusion to the claw-like costa of the valve. Gender: feminine.

## Key to species

- 1 Antennae of ♂ on basal two-thirds bipectinate with short rami. Costa of valve curved; ventral part of sacculus not or scarcely longer than dorsal part, its apex sparsely setose (Fig. 546). ♀ genitalia as in Fig. 771. Eastern parts of South Africa; eastern Zimbabwe ..... 2. *acorema* sp. n., p. 72
- Antennae of ♂ serrated. Costa of valve recurved; ventral part of sacculus much longer than dorsal part, with subapical hair-pencil (Fig. 545). ♀ genitalia not seen. Kenya, Uganda and Cameroon ..... 1. *crypsispila* (Fletcher), p. 72

## Descriptions of species

### 1. *Chelotephrina crypsispila* (Fletcher, 1958) comb. n.

Figs 82; 545

*Tephrina crypsispila* Fletcher, 1958b: 130. Holotype ♂, **Uganda**: Ruwenzori Range, Mahoma River, 6,700 ft, 13.–16.VIII.1952 (D.S. Fletcher); Ruwenzori Exped[ition] B.M. 1952–566; Geometridae genitalia slide No. 1812; *Tephrina crypsispila* Fletcher Holotype ♂ (BMNH) [examined]. Paratypes (6♂). **Uganda**: 1♂, same data as holotype; 2♂, Bwamba Country, 1938 (Harper). 1♂, **[Cameroon]**: Kamerun, no further data (Schwab). 2♂, **[Cameroon]**: Afriq[ue] Occid[entale], Kamerun, Johann-Albrechts-Höhe Station 1898 (L. Conradt); Ex Oberthür Coll. Brit. Mus. 1927–8 (1 dissected, Geometridae genitalia slide No. 17737) (BMNH) [examined].

FORE WING LENGTH. 16–18 mm (♂).

ADULT ♂ (Fig. 82). Well medium-sized. Antennae shortly bipectinate for basal two-thirds. Apex of fore wing pointed; termen of hind wing angled at about 120°. Ground colour of wings ochreous, densely striated with grey and more or less heavily suffused with brown. Lines rather faint and incomplete; postmedian acutely angled below costa of fore wing. Discal spots larger on fore wing, pupils white, but not conspicuous. Some specimens with a large trapezoidal area between basal and postmedian on fore wing, varying in colour from yellowish to orange to grey. Underside light to greyish ochre, irregularly striated with brown. Postmedian area with a row of small greyish brown spots. Vestiture of thorax and abdomen ochreous to greyish-brown. Hind tibia of ♂ dilated, with prominent hair-pencil. Setal comb on A3 well developed.

MALE GENITALIA (Fig. 545). Uncus trilobate, with short and pointed tip; surface evenly setose. Gnathos cingulate, rather weakly developed. Costa of valve narrow, terminating in a strongly recurved hook. Sacculus cleft; dorsal part short and angular, ventral part elongated and very narrow, bearing subapical hair-pencil. Termen of dorsal part of sacculus with a dense patch of elongated scales. Saccus short, broadly rounded. Aedeagus massive, slightly tapering anteriorly. Vesica with single apical cornutus, reaching about half length of aedeagus. Octavals absent.

DIAGNOSIS. Very similar to *C. acorema*, below. Males can be separated by antennal structure (shortly bipectinate in *crypsispila*, serrated in *acorema*) and differences in the genitalia, particularly the orientation of the costa (curved in *acorema*, recurved in *crypsispila*) and the ventral part of the sacculus, which is much longer in *crypsispila*.

BIOLOGY. The species inhabits afromontane forest. Adults have been collected in August.

DISTRIBUTION. Kenya, Uganda and Cameroon.

MATERIAL. 29♂ and 3♀. 32 Nairobi (NMKE).

LOCALITIES. **Kenya**: Kakamega (9). **Uganda**: Unyoro, Bugoma Forest (2), Ankole, Kalinzu Forest (14), Jinja, Mabira Forest (2), Bwamba Forest (2), Bwamba Toro (1), Toro, Kibale Forest (1), Eigezi, Impenetrable Forest (1).

### 2. *Chelotephrina acorema* sp. n.

Figs 83, 84; 546, 771; 977

TYPE MATERIAL. Holotype ♂, **[South Africa]**: [Eastern Cape]: Transkei, The Haven, 13.2.1985, N.J. Duke leg.; TM Lep[idoptera] Het[erocera] genitalia slide No. 11016 (TM). Paratypes (17♂, 8♀). 9♂, 7♀, **[South Africa]**: [Eastern Cape]: *ibidem*, dated 22.XII.1980 (♂), 23.XII.1980 (♀), 6.XI.1981 (♀), 7.IX.1985 (1♂, 1♀, ♀ dissected, TM Lep[idoptera] Het[erocera] genitalia slide No. 11017), 11.I.1986 (3♀), 11.II.1986 (2♂), 28.XII.1986 (5♂, 1♀). **[KwaZulu-Natal]**: 5♂, Ngome State Forest, 27°48'S 31°25'E, 18.–22.I.1993 (Krüger & Dombrowsky). **[Mpumalanga]**: 1♂, Uitsoek, Grootkloof indigenous forest, 25°15'S 30°33'E; 6.II.1987, E-Y: 2428, UV light collection, leg. Endrödy-Younga. **[Zimbabwe]**: 2♂, Mt. Selinda, 9.–17.IV.1956 (v.Son & Vári); Bunga Forest, Vumba, 23.10.[19]89 (N.J. Duke) (TM, N.J. Duke collection).

FORE WING LENGTH. 15–16 mm (♂), 14–17 mm (♀).

ADULT (Figs 83, 84). Antennae of ♂ serrated, otherwise undistinguishable from *C. crypsispila*, above. For a description see under that species.

MALE GENITALIA (Fig. 546). Uncus very prominent, trilobate; gnathos cingulate with narrow arms and centre. Valve very characteristic; costa long, curved, drawn out apically into a claw-like process. Sacculus not very large, cleft; ventral part not longer than dorsal part. Aedeagus elongated, cylindrical and with one irregularly shaped apical cornutus. Octavals absent.

FEMALE GENITALIA (Fig. 771). Papillae anales well developed, rounded. Apophyses posteriores long and slender; a. anteriores markedly stouter, about two-thirds length of former. Operculum small, semicircular. Ductus bursae short, with lateral sclerotizations near ostium; corpus bursae large and pear-shaped. Signum prominent, situated near centre of corpus.

DIAGNOSIS. See under *C. crypsispila*, above.

BIOLOGY. The species is associated with afromontane

forest. Adults have been collected in January–February, April, September and November–December.

**DISTRIBUTION** (Fig. 977). Locally from south-east Zimbabwe to the eastern Transvaal (Mpumalanga), KwaZulu-Natal and the former Transkei.

**FURTHER MATERIAL.** 3♂. 3 Pretoria (TM). Excluded from the type series on account of their poor quality.

**LOCALITIES. South Africa, KwaZulu-Natal:** Ngome State Forest (2), Mbona (1).

**ETYMOLOGY.** From Greek  $\alpha$ -, alpha privative and κόρεμα, τό, a brush: the species lacks the hair brush present on the tip of the sacculus of *C. crysispila*.

## 2. Genus *TEPHRINA* Guenée, [1845]

*Tephrina* Guenée, [1845], in Duponchel, Catalogue méthodique des Lépidoptères d'Europe: 246. Type species: *Geometra murinaria* [Denis & Schiffermüller], 1775, Ankündung [sic] eines systematischen Verzeichnisses der Schmetterlinge der Wienergegend: 105, by subsequent designation by Moore, [1887], Lepidoptera of Ceylon 3: 470.

*Tephrina* Guenée; Guenée, [1858]: 96; Walker, 1861: 951; Hampson, 1895: 209; Prout in Seitz, 1915b: 405; Janse, 1932: 235; Wehrli in Seitz, 1940: 398; Forster & Wohlfahrt, 1981: 229.

**GENERAL APPEARANCE** (Figs 85, 86). Medium-sized macarines of grey, purplish-grey or ochreous coloration. Wings rounded. Wing pattern simple and lines often more or less reduced; discal spots present. Fore wing pattern consisting of basal, median, and postmedian line. Hind wing usually with postmedian line only. Head: antennae of ♂ bipectinate, of ♀, weakly serrated. Frons smooth, rounded or slightly bulging. Labial palpi pointed or somewhat obtuse, porrect or slightly ascending; 1–2 times diameter of eyes. Proboscis well developed. Legs: slender and rather long; hind tibia of ♂ not modified or grooved on inner side, bearing a weakly developed hair-pencil.

**VENATION** (Fig. 15, from *T. murinaria*). Fore wing: Sc free, R<sub>1</sub>+2 coincident and from near upper angle of cell; R<sub>3</sub>–5 stalked from shortly beyond cell; fovea present. Hind wing: Sc+R<sub>1</sub> and Rs touching for a distance; 2A present but weak, not reaching beyond cell.

**MALE GENITALIA** (Fig. 547). Uncus triangular rather than dome-shaped, with pointed apex; densely and fairly evenly setose. Gnathos cingulate, with broad arms and broadly crescentic medial element. Valves similar in shape to those in *Isturgia* and *Itame* but with pointed saccus. Octavals absent (*murinaria*) or developed as small points (*plumbariooides*) or small rounded lobes only (*arenacea*) (Scoble & Krüger, *in press*).

**FEMALE GENITALIA** (Fig. 772). Sterigma well developed, shield-shaped. Antrum prominent, with longitudinal bands. Corpus bursae membranous, more or less pear-shaped, bearing stellate signum.

**DISTRIBUTION.** In its strict sense (Scoble & Krüger, *in prep.*), *Tephrina* is a small Eurasian genus; the affinities of '*Selidosema*' *penthearia* from Australia remain unclear. In the study area, the type species, *murinaria* ([D. & S.]), is the only representative. Essentially a European species, it has also been recorded from Morocco.

**REMARKS.** Among the Afrotropical fauna, the species of the *Isturgia catalaunaria*-group are closest in facies and genitalia structure to the European type-species of *Tephrina*, *murinaria* ([Denis & Schiffermüller]). The issue of the validity of *Tephrina* versus *Isturgia* is problematic. Its position in the cladogram in Fig. 21 above suggests that *Tephrina* is merely a lineage within *Isturgia*, although the analysis was based on a limited set of characters.

## Description of species

### 1. *Tephrina murinaria* ([Denis & Schiffermüller], 1775)

Figs 85, 86; 547, 772

*Geometra murinaria* [Denis & Schiffermüller], 1775: 105. Type(s): [**Austria**]: Vienna district (lost) [not examined]. The species' identity is well established.

The nominate subspecies occurs from southern France to Issyk-Kul (Prout, 1915b). In the study area, the species is represented by ssp. *cineraria* (Duponchel). The status of this taxon is not clear and it is probably of infrasubspecific rank, as suggested by Prout (1915b) and as listed in the BMNH card index. However, as I have been unable to examine North African material, I follow the most recent treatment by Rungs (1981).

### 1. *Tephrina murinaria cineraria* (Duponchel, 1829)

*Fidonia cineraria* Duponchel, 1829: 440, pl. 167, Figs 1, 2. Type(s): not stated, male(s), female(s), France: mid France (not examined).

*Tephrina murinaria* ab. *cineraria* (Duponchel); Prout, 1915b: 405.

*Tephrina murinaria* *cineraria* (Duponchel); Blachier, 1908: 22; Rungs, 1981: 263.

**FORE WING LENGTH.** 13 mm (both sexes).

**ADULT** (Fig. 85, 86). Antennae of ♂ bipectinate with

short rami; of female, weakly serrated. Wings relatively broad, forewings with straight costa, hind wings with a very small angling at M3. Ground colour of wings pale cream-white, with usually dense, fine greyish-brown striation. Postmedian area of both wings suffused with greyish-brown. On forewings, all three lines present. Basal line weak but well defined; median indistinct; postmedian line relatively best developed, especially in females. Discal spots present but indistinct. Hind wings almost identical in markings, but basal line virtually obsolete. Cilia of both pairs of wings indistinctly chequered. Underside whitish rather than cream, with irroration coarser and slightly less dense. Lines developed similar to upper side but less well defined. Specimens referable to *cineraria* are characterized by weakly developed markings, resulting in an almost unicolorous appearance. Vestiture of body and appendages cream, mixed with greyish-brown scales. Hind tibiae of ♂ somewhat dilated but not carrying hair-pencil. Setal comb on A8.

**MALE GENITALIA** (Fig. 547). Uncus broadly triangular, with beak-like apex, setose. Gnathos with fairly broad arms, medial element upturned, strongly developed, broadly trapezoidal. Genital capsule wide, octagonal in contour; saccus extended, short but massive. Valvae with narrow, gently curved costa and long, acutely pointed sacculus. Juxta weakly developed, rounded. Aedeagus cylindrical, short and stout; vesica lacking cornuti. Octavals absent, but central part of segment A8 with slightly denser sclerotization.

**FEMALE GENITALIA** (Fig. 772). Papillae anales long and narrow. Both pairs of apophyses moderately stout, a. anteriores about two-thirds length of a. posteriores. Sterigma well developed, forming a broadly crescentic sclerotization. Antrum resembling a wide funnel, wall with longitudinal bands. Bursa copulatrix pear-shaped, with gradual transition between ductus and corpus bursae. Signum stellate, of medium size.

**DIAGNOSIS.** Within the macariine fauna of the study area, the wing pattern is sufficient for identification.

**BIOLOGY.** In the European part of its range, larvae of *T. murinaria* feed on *Onobrychis*, *Medicago*, *Trifolium* and *Vicia* (Leguminosae).

**DISTRIBUTION.** Within the study area confined to Morocco. The inclusion in the Moroccan fauna by Rungs (1981) is based on a single record from Tanger by Blachier (1908); apparently the species has not been recorded in Africa since.

**MATERIAL.** 1♂ (dissected, BM Geometridae genitalia slide No. 19985) and 1♀ (dissected, BM Geometridae genitalia slide No. 19986). 2 London (BMNH).

**LOCALITIES.** [France]: Pyrénées Orientales, Vernet-les-Bains (1). [Patria?]: Dolina, Deliblat (1).

### 3. Genus *ISTURGIA* Hübner, [1823]

*Isturgia* Hübner, [1823], *Verzeichnis bekannter Schmettlinge* [sic]: 297. Type species: *Geometra conspicuata* [Denis & Schiffermüller], 1775, *Ankündigung* [sic] eines systematischen Verzeichnisses der Schmetterlinge der Wienergegend: 316, by monotypy. Type locality: [Austria]: Vienna district (Fletcher, 1979).

*Enconista* Lederer, 1853: 234. Type species: *Fidonia perspersaria* Duponchel, [1830] 1829, by subsequent designation by Joannis, 1912: 20. Type locality: France. See also Fletcher (1979). Listed as a junior synonym by Scoble (1999).

*Bichroma* Gumppenberg, 1887, *Nova Acta Academiae Caesareae Leopoldino Carolinae germanicae naturae curiosorum* 49: 382, 388 (as *Dichroma*). Type species: *Noctua famula* Esper, 1787, *Die Schmetterlinge* 4: pl. 106, Fig. 1789, *ibidem* 4: 164, by monotypy. Type locality: not stated [Europe] (Fletcher, 1979). Listed as a junior synonym by Scoble (1999).

*Isturgia* Hübner; Prout in Seitz, 1915b: 397; Wehrli in Seitz, 1940: 394.

*Enconista* Lederer; Staudinger & Rebel, 1901: 355; Prout in Seitz, 1915b: 406; Wehrli in Seitz, 1940: 655; McGuffin, 1972: 62; Hausmann, 1990: 104.

*Bichroma* Gumppenberg; Prout in Seitz, 1915: 398; Wehrli in Seitz, 1940: 393.

**GENERAL APPEARANCE** (Figs 87–161). Small to fairly large macarines (fw length 10–22 mm) of usually grey but also yellowish, brownish or greenish colour. Fore wing rounded or, rarely, pointed, but never falcate or with emarginate termen. Hind wing rounded or, rarely, crenulated, but never tailed. Wing patterns simple and lines often more or less reduced; discal spots present. Fore wing pattern consisting of basal, median, and postmedian line. Hind wing usually with postmedian line only. Head: antennae of ♂ bipectinate, of ♀, ciliate, or, rarely, shortly bipectinate. Frons smooth, rounded or slightly bulging. Labial palpi pointed or somewhat obtuse, porrect or slightly ascending; 1–2 times diameter of eyes. Proboscis well developed. Legs: slender and rather long; hind tibia of ♂ not modified or grooved on inner side, bearing a weakly developed hair-pencil.

**VENATION** (Fig. 16). The venation varies between species, as already noted by Janse (1932).

Variation mostly concerns Sc and Rs in the fore wing. Vein 2A usually present in hind wing but absent in *I. catalaunaria*. Fovea usually present but absent in *I. geminata* (Warren). Type species of *Enconista* Lederer with the following venation: Fore wing: R1 briefly touching Sc beyond cell, then free; R2 and R3 free; R4+5 stalked; 1A and 2A separated for a short distance near wing base. Fovea present but not very strongly developed; internal membrane not corrugated. Hind

wing: Sc+R1 and Rs diverging near base, then approximating, but not anastomosing, for a short distance; M2 present as a weak fold from middle of cell to about half distance from cell to termen; 2A weakly developed, not reaching beyond cell.

**MALE GENITALIA** (Figs 548–584). Uncus well developed and arising from broad base, in most species triangular or more or less dome-shaped but 'mitre-shaped' (e.g., Fig. 579) in the *presbitaria*-group. Uncus usually densely setose, but not showing tendency to develop horns. Gnathos present and mostly somewhat angular; in *I. supergressa*- and *catalanaria*-groups appearing rounded in ventral view, with large medial element ('cingulate' type, Fig. 556). Tegumen and vinculum ranging from square to rounded; saccus short and stout to thin and elongated. Valve cleft but not very deeply so. Costa thin to stout, curved or straight, but always lacking ventral process. Sacculus prominent, more or less broadly triangular; apex rounded or (rarely) drawn into a point. Outer margin of sacculus occasionally with discrete sclerotizations, but true processes as in *Chiasmia* absent. Aedeagus variable in size, vesica mostly with one or several cornuti, frequently of typical shape and arrangement; microcornuti only present in some species of *supergressa*-group. Octavals present or absent.

**FEMALE GENITALIA** (Figs 773–813). Papillae anales of average size, without particular modifications. Apophyses slender to rather robust, with a. anteriores usually somewhat stouter. Sterigma: l. antevaginalis mostly well developed, shield-shaped; l. postvaginalis not modified. Operculum frequently present. Antrum prominent. Ductus bursae with some sclerotizations in most species; in *I. presbitaria*-group, very long and strongly sclerotized. Corpus bursae either membranous, with or without signum, or wall of leathery texture and more or less completely covered with small spines. In those species where a signum proper is present, the spicula often very long.

**DISTRIBUTION.** *Isturgia* is a fairly large genus, containing at present several dozen species which are distributed in the Palaearctic, Afrotropical and Oriental regions. The taxa from the neotropics currently placed in *Tephrina* differ rather strongly from the Old World forms and probably belong to another genus. For southern African distribution, see Figs 978–985. *Enconista dislocaria* Packard from the Nearctic region (Hodges *et al.*, 1983) is probably also referable to *Isturgia*, but no material was seen.

**REMARKS.** Among the Afrotropical fauna, the species of the *catalanaria*-group are closest in facies and genitalia structure to the European type-species of *Tephrina*, *murinaria* [Denis & Schiffermüller].

## Key to species-groups and species of uncertain group affinity

- 1 Small, yellowish (Fig. 160) or orange-brown moths (Fig. 159) (fw length 10–13 mm); two species, one confined to southern Africa, the other to Palaearctic North Africa ..... 2
- Mostly larger species (fw length 10–18 mm), predominantly grey (Figs 87–158, 161); in excess of 40 species, distributed throughout Afrotropical region ..... 3
- 2(1) Moths yellowish (Fig. 160). ♂ genitalia with short valves having both costa and sacculus curved (Fig. 583). ♀ genitalia as in Fig. 813. Southern Africa .... ..... 41. *geminata* (Warren), p. 112
- Moths with purplish-brown forewings and orange hind wings (Fig. 159). ♂ genitalia with valves having long, spatulate costa and straight sacculus (Fig. 582). ♀ genitalia as in Fig. 812. North Africa ..... ..... 40. *famula brunnea* (Le Cerv), p. 111
- 3(1) Wings with bark-like pattern (Fig. 158). Costa of valve narrow, strongly curved (Fig. 581). ♀ genitalia with peculiar, circular antrum (Fig. 811). Madagascar ..... 39. *devecta* (Herbulot), p. 111
- Wings lacking bark-like pattern (Figs 87–157, 161). Costa of valve straight or, if curved, much less strongly so (e.g., Fig. 573). ♀ genitalia with antrum not as in Fig. 811. Mostly on African mainland... 4
- 4(3) ♂ genitalia with unique uncus, dome-shaped with inward-pointing tip; gnathos reminiscent of cingulate type but with differently shaped medial element (Fig. 584). ♀ unknown ..... ..... 42. *perplexa* sp. n., p. 113
- ♂ genitalia with uncus and gnathos not as above ... ..... 5
- 5(4) ♂ genitalia with gnathos angular (e.g., Fig. 564); octavals strongly developed. ♀ genitalia with antrum showing conspicuous lateral sclerotizations (e.g., Fig. 795) or bursa copulatrix pipe-shaped, with heavily chitinized ductus (e.g., Fig. 805) ..... 8
- ♂ genitalia with gnathos of cingulate type (Figs 548–563); octavals poorly developed or absent. ♀ genitalia variable but not of the types described above (Figs 773–791) ..... 6
- 6(5) Robust species (Figs 95–118). ♂ genitalia with triangular, bluntly rounded sacculus and massive cingulate gnathos (Figs 553–563). ♀ genitalia with long antrum and wall of corpus bursae either partly spinose or membranous, with or without signum (Figs 778–791) ..... *supergressa*-group, p. 81
- More delicate species (Figs 87–94). ♂ genitalia with sacculus triangular to squarish and acutely pointed or, if rounded, less bluntly so; gnathos less massive (Figs 548–552); ♀ genitalia variable but not as above (Figs 773–777) ..... 7

- 7(6)Grey species (Figs 87–91). ♂ genitalia with triangular sacculus, in three species forming acutely pointed, recurved tip (Figs 548–550); octavals small or absent. Known ♀ genitalia variable (Figs 773–775) ....  
..... *catalaunaria*-group, p. 76
- Ochreous or brown species (Figs 92–94). ♂ genitalia with longer, less triangular sacculus (Figs 551, 552); octavals absent. ♀ genitalia with operculum and well defined, short antrum (Figs 776, 777) ....  
..... *sakalava*-group, p. 80
- 8(5) ♂ genitalia with dome-shaped uncus (Figs 564–573). ♀ genitalia with short ductus bursae, showing conspicuous, discrete sclerotizations (Figs 792–802)  
..... *disputaria*-group, p. 94
- ♂ genitalia with mitre-shaped uncus (Figs 574–580). ♀ genitalia with pipe-shaped bursa; ductus bursae very long and heavily sclerotized (Figs 803–810) ..... *presbitaria*-group, p. 104

## Descriptions of species-group taxa

### 1. *Isturgia catalaunaria*-group

This group contains three ochreous-grey species of rather similar facies. Antennae of males bipectinate, those of females, ciliate. One species is very widely distributed, occurring in the entire Ethiopian region and the southwestern Palaearctic; the others, by contrast, are restricted to Madagascar and the Comoro Islands and eastern Africa, respectively. Apart from the facies of the adult, an autapomorphy for the group is provided by the acutely pointed, recurved sacculus in the male genitalia.

**MALE GENITALIA** (Figs 548–550). Uncus broadly triangular to dome-shaped, setose. Gnathos strongly developed, cingulate. Costa of valve slightly to clearly recurved and somewhat dilated apically. Sacculus acutely pointed, recurved (this is not well developed in *I. univirgaria*). Saccus mostly well developed, extended to form tip. Aedeagus large relative to size of genitalia; vesica bearing microcornuti and/or true cornuti. Octavals small and shallow.

**FEMALE GENITALIA** (Figs 773–775). Papillae anales normal. Apophyses thin. Sterigma present (*I. catalaunaria*, *I. triseriata*) or absent (*I. univirgaria*). Antrum well developed, differing in shape between species. Bursa copulatrix pear-shaped or resembling a broad tube; signum present.

**REMARKS.** There exists some confusion in the literature concerning the synonymy of *I. catalaunaria* and its close relatives, particularly the taxa occurring in the Oriental zone. Having examined all available types, I provide a provisional checklist immediately below as follows:

1. *catalaunaria* (Guenée) – Africa, southern Spain

= *proxantharia* (Walker)  
= *occupata* (Walker)  
= *cogitata* (Walker)  
= *largificaria* (Möschler)  
= *dataria* (Walker)  
= *defectaria* (Walker)

2. *falsaria* (Walker) – Hainan, Sri Lanka, India  
= *bolina* (Swinhoe)
3. *strigosata* (Warren) – Philippines  
= *catapasta* (Westwood)
4. *munda* (Warren) – Sumba

5. *univirgaria* (Mabille) – Madagascar, Comoro Islands

*Isturgia klapperichi* (Wiltshire) from Afghanistan and *I. homalodes* (Meyrick) from British New Guinea are presumably also closely related, but not sufficiently similar to *catalaunaria* to give rise to confusion.

### Key to species

- 1 Adult (Fig. 89) with prominent, dark postmedian fascia, broken up into numerous small maculae. ♂ genitalia (Fig. 549) with very large sacculus and broad, but weakly chitinized, octavals. ♀ genitalia (Fig. 774) with large, circular ostium. Tanzania to Zimbabwe ..... 2. *triseriata* (Prout), p. 79
- Adult (Figs 87, 88, 90, 91) without or with much less prominent postmedian fascia. ♂ genitalia (Figs 548, 550) with smaller sacculus and octavals narrower. ♀ genitalia (Figs 773, 775) with much smaller ostium. One species restricted to Madagascar/Comoros, the second widely distributed in study area ..... 2
- 2(1) Adults without or with very indistinct postmedian line (Figs 90, 91). ♂ genitalia (Fig. 550) with small, moderately pointed sacculus; aedeagus fairly slender. ♀ genitalia (Fig. 775) lacking sterigma. Madagascar and Comoro Islands .....  
..... 3. *univirgaria* (Mabille), p. 79
- Adults with complete postmedian line (Figs 87, 88). ♂ genitalia (Figs 548) with larger, acutely pointed sacculus; aedeagus stout. ♀ genitalia (Fig. 773) with well-developed sterigma. Widely distributed in Afrotropical region but absent from Madagascar; Palaearctic ..... 1. *catalaunaria* (Guenée), p. 76

### 1. *Isturgia catalaunaria* (Guenée, [1858]) comb. n.

Figs 87, 88; 548, 773; 978

*Psamatodes catalaunaria* Guenée, [1858]: 108.  
Holotype ♂, [Spain]: Catalonia (not located in BMNH or MNHN and probably lost) [not examined].

*Tephritis datoria* Walker, 1861: 961. Holotype ♂, [South Africa]: Cape; Synonym of *T. catalaunaria* Guen. = *falsaria* Walk. (L.B.P. 18.3.32) [in Prout's hand]; type no. 2502 (OMU) [not examined]. See Remarks.

*Tephritis defectaria* Walker, 1861: 962. Holotype ♂, [South Africa]: Cape; synonym of *catalaunaria* Guen. = *datoria* Walk. = *falsaria* Walk. (L.B.P. 18.3.32) [in Prout's hand]; type no. 2500 (OMU) [not examined]. See Remarks.

*Aspilates occupata* Walker, 1862: 1071. LECTOTYPE ♂, here designated, South Africa: 44 6/South Africa: 13. *Aspilates occupata*? *Aspilates? justaria*; *Aspilates occupata* Walk. Type ♂ a.; Genitalia slide Geom[etridae] 1951–189 (BMNH) [examined].

*Panagra cogitata* Walker, [1863]: 1661. Holotype ♂, South Africa: 44 6/South Africa; *Panagra? cogitata*; Genitalia slide Geom[etridae] 1951–190 (BMNH) [examined].

*Aspilates proxantharia* Walker, [1863]: 1679. LECTOTYPE ♂, here designated, [South Africa]: 61 102/Knysna; Genitalia slide Geom[etridae] 1951–191 (BMNH) [examined]. Paralectotype ♀, [South Africa]: 61 102/Cape Town, August; *Aspilates proxantiar[ia]*? *Aspilates exumbrata* (BMNH) [examined].

*Tephritis (Eubolia) defectaria* Walker; Wallengren, 1875: 122.

*Tephritis datoria* Walker; Wallengren, 1875: 122; Janse, 1917: 112 (as good species); 1932: 238 (synonymy); Debauche, 1938: 45; Fletcher, 1978a: 76 (as synonym of *catalaunaria*).

*Semiothisa largificaria* Möschler, 1887: 95. Type, [Ghana:] Gold Coast, Accra (not located in SMF or ZSBS) [not examined].

*Eubolia proxaulkaria* (Walker); Distant, 1892: 240. Misspelling.

*Tephritis catalaunaria* (Guenée); Hampson, 1895: 210; 1908: 477 [misidentification *teste* Herbulot, 1978]; 1910: 469; Swinhoe, 1904: 511; Janse, 1917: 112; 1932: 238; Le Cerf, 1922: 444; Prout, 1932a: 480; Debauche, 1938: 45; Schmidlin, 1964: 109; Fletcher, 1978a: 76; Herbulot, 1978: 161; 1981: 223; Wiltshire, 1982: 305; 1990: 134.

*Eubolia catalaunaria* (Guenée); Staudinger & Rebel, 1901: 354.

*Semiothisa largificaria* Möschler; Swinhoe, 1904: 506 (synonymy); Janse, 1932: 238; Debauche, 1938: 45; Fletcher, 1978a: 76 (as synonym of *catalaunaria*).

*Macaria largificaria* (Möschler); Hampson, 1910: 468.

*Eubolia catalaunaria* (Guenée); Spuler, 1910: 117.

*Tephritis defectaria* Walker; Janse, 1917: 112 (as good species); 1932: 238 (synonymy); Debauche, 1938: 45; Fletcher, 1978a: 76 (as synonym of *catalaunaria*).

[*Tephritis bolina* Swinhoe; Janse, 1932: 238 (synonymy); Debauche, 1938: 45 (as synonym of *catalaunaria*). Misidentification.]

*Panagra cogitata* Walker; Janse, 1932: 238 (synonymy); Debauche, 1938: 45; Fletcher, 1978a: 76 (as synonym of *catalaunaria*).

[*Macaria falsaria* Walker; Janse, 1932: 238 (synonymy); Debauche, 1938: 45 (as synonym of *catalaunaria*). Misidentification.]

*Aspilates occupata* Walker; Janse, 1932: 238 (synonymy); Debauche, 1938: 45; Fletcher, 1978a: 76 (as synonym of *catalaunaria*) (see also Remarks).

*Aspilates proxantharia* Walker; Janse, 1932: 238 (synonymy); Debauche, 1938: 45; Fletcher, 1978a: 76 (as synonym of *catalaunaria*).

[*Tephritis falsaria* (Walker); Fletcher, 1978a: 76. Misidentification.]

[*Tephritis catalaunaria falsaria* (Walker); Herbulot, 1981a: 223. Misidentification.]

FORE WING LENGTH. 12–15 mm (♂), 11–16 mm (♀).

ADULT (Figs 87, 88). Medium-sized to rather large. Ground colour of wings ochreous to mouse-grey, with dense grey striation. Postmedian area, particularly of ♀, frequently with a row of small dark spots on fore wing. Basal and median line not conspicuous and rather faint; postmedian better developed, but occasionally also indistinct. Discal spots variable, absent to well developed. Underside ochreous, more or less heavily suffused with grey and with dark dusting. Markings variably developed, as on upperside, but fainter. Vestiture of thorax and abdomen ochreous to greyish ochreous. Hind tibia of ♂ not modified. Setal comb on A3 absent.

MALE GENITALIA (Fig. 548). Uncus broadly triangular; gnathos cingulate, with broad arms. Costa of valve strongly curved and dilated apically, forming a small spatula. Sacculus small, with recurved, acutely pointed tip. Saccus well developed. Aedeagus widest below the pointed tip, vesica with a single, large apical cornutus formed by numerous microcornuti. Octavals weakly sclerotized and somewhat irregular in shape.

FEMALE GENITALIA (Fig. 773). Papillae anales well developed. Both pairs of apophyses slender; a. anteriores about half length of a. posteriores. Sterigma rather elaborate, as in figure. Bursa copulatrix pear-shaped; ductus bursae with localized sclerotizations; corpus bursae large, membranous. Signum circular, exhibiting some intraspecific variation in shape.

EARLY STAGES. Egg: Ovoid and rather elongated, length 0.74 mm, width 0.40 mm. Sculpture hexagonal, not very strongly developed. Green on oviposition, darkening strongly after two days. Larva. First instar: length 2.57 mm, width 0.14 mm, markedly long and thin. Head: width 0.26 mm, very pale brown, ocelli darker. Body pale yellowish-green, dorsum with 5 rather broad, dark green lines (dorsal and addorsal); sides lacking markings; venter with 3 dark green lines. Thoracic and abdominal legs of ground colour. No

description of further instars available as the correct food plant could not be offered.

**DIAGNOSIS.** Confusion is possible with 3. *I. univirgaria*, below, although adults of that species are on average smaller and of a purer grey coloration. The differences in genitalic structure can be seen from the illustrations. Distributional data are also important, as the two species are allopatric, *I. univirgaria* being restricted to Madagascar.

**BIOLOGY.** The species was bred by N.J. Duke on *Rhynchosia totta* (Thunb.) DC. and by H.S. Staude on *Indigofera* sp. (both Papilionoideae). Adults are active throughout the year. In Europe, *I. catalaunaria* has been reared on *Dorycnium* sp. (Spuler, 1910).

**DISTRIBUTION** (Fig. 978). In the Palaearctic recorded from southern Spain. In the Afrotropical region widely distributed from the Sudan southwards. Widespread in southern Africa, but absent from the more arid interior and western parts. Saudi Arabia (Wiltshire, 1982; 1990).

**MATERIAL.** 270♂ (5 dissected, TM genitalia slides No. 951, 11012, 11027, 11172; SANC slide AcP 9292) and 188♀ (7 dissected, TM genitalia slides No. 11013, 11035, 11208–11; SANC slide No. 9293). 7 Paris (MNHN), 16 Berlin (ZMHB), 15 Munich (ZSBS), 331 Pretoria (TM), 16 Pretoria (SANC), 16 Cape Town (SAM), 14 Bulawayo (NMBZ), 32 Nairobi (NMKE), 10 N.J. Duke collection, 1 D.M. Kroon collection.

**LOCALITIES.** **South Africa, Transvaal:** [Gauteng]: Johannesburg (1), Witkoppen/Johannesburg (4), Suikerbosrand Nature Reserve (35), Pretoria (32), Boekenhoutskloof (1), Mooiplaas, Bronkhorstspruit District (3), Farm Doringkraal 420, Cullinan District (1), Magaliesberg above Mountain View (1), Irene (1), Krugersdorp (1), Heidelberg (2), Renosterpoort (3). [North-West]: Rustenburg (10), Vryburg (2). [Northern Province]: Doornhoek Farm (1), Minastune (1), Mosdene Farm/Naboomspruit (2), Rooiberg (2), Blouberg (1), Farm Ettenmouth, Alldays District (1), Blyde River (2), Wyllie's Poort (3), Tshakoma, Zoutpansberg (1), Nylstroom (1), Mariepskop (1), Nylsvley (15), Mariti Forest (1), Pietersburg (1); Kruger National Park: Pafuri (2), Letaba (4), Nwanedzi (3), Punda Milia (3). [Mpumalanga]: Nelshoogte Forestry, Barberton District (1), Barberton (2), Nelspruit (2), Middelburg (2), Stoffberg, Middelburg District (2), Kastrol Nek (2), Pretoriuskop (5), Klipfontein (1); Kruger National Park: Skukuza (3), Matjulwana (3), Malelane (2). **Free State:** Sasolburg (10), Parys (1), Bloemfontein (4). **KwaZulu-Natal:** no further data (2), Mont-aux-Sources (2), Stanger (1), Durban (10), Pinetown (1), Umhlanga Rocks (1), Magude (1), Howick (1), Umdoni Park (1), New Hanover (4), Kloof (1), Ladysmith (1), Pietermaritzburg (1), Estcourt (1), M'fongosi (2), Mkuzi (16), Umkomas (2), Jozini

Dam (3), Dukuduku Forest (1), Umgeni Valley (2), Impetyeni Forest (1), N'kandla (2). **Cape Province:** [Western Cape]: Cape Peninsula (1), Cape Town (7), Harkerville (2), Kogelberg Nature Reserve (25), Saasveld (6), Camps Bay (3), Grootvaderbos, Heidelberg District (2), Stormsriviermond (1), De Hoop, Bredasdorp District (1), Elsenburg (1), Stellenbosch (1), Fish Hoek (1), Bontebok National Park, Swellendam District (1), near Melkbosstrand (1). [Eastern Cape]: Port Elizabeth (3), Tsitsikama, Goesabos Forestry (2), Oudebos on Garden Route (1), East London (5), King Williamstown (1), Emjanyana (1), Bonza Bay (1), Groot River Pass (1), Buffalo Pass (1), Grahamstown (2), Umtata (8), Port St. John's (1). Ambiguous: Seaview (1). **Moçambique:** Delagoa Bay (4), Inyack Island (2), M'gazi/Kombamune (2). **Botswana:** Gaborone (1). **Zimbabwe:** Xmas Pass (1), Hubert Young Drive, Kopje View (2), Laurenceville, Vumba (1), Mutare (Umtali) District (1), Mt. Selinda (2), Harare (Salisbury) (9), Christon Bank (1), Bulawayo (1), Bubye Bridge (2), Gatooma Research Station (6), Hope Fountain (1), Balla Balla (1), Msali Bridge (2), Kazuma Forest, Kazuma Pan National Park (1), Nyahungwe, Lundi River (1), Doddieburn Ranch (1), Victoria Falls Camp (12), Victoria Falls Road, 38 m from Bulawayo (8), Van Niekerk Hotel near Gwai Bridge (1), Wankie (2). **Zambia:** 8 m N. Livingstone (3), Abercorn, Lake Chila (1), Chiwefwe (1). **Zaire:** Congo (no further data) (1). **Angola:** SW., Fito (1). **Nigeria:** N., Zaria, Samaru (1), Kaduna (4). **Cameroon:** Int., Garua (6), no further data (1). **Upper Volta:** Bobo (1). **Kenya:** Coast, Gazi Forest (1), Kitale (1), Nyanza, Lambwe Valley (1), Shinyanga, Mwandui (5), Tiwi Mombasa (2), Eldoret (1), Nanyuki (2), Thika, Fourteen Falls (1), Ngong/Nairobi (1), Lukinga, Athi River (1), 8 m S. Malindi, Sokoke Forest (1). **Uganda:** Q[ueen] E[lisabeth] Park, Isbasha River Camp (1), Entebbe (1), N. Acholi, Madi Opei (1), Unyoro, Bugoma Forest (1). **Tanzania:** Ukerewe Island (1), Lake Ukerewe (1), Oldeani (1), Eigoma, Mukuyu (1), Usambara, Amani (1), Mwanza (1), Same, 1000 m (1), Dar-es-Salaam (5), Mikindani (1), Bumbuli (1), Pangani (1), Mhonda (2), Kurasini, Dar-es-Salaam Distr. (3), Kigonsera (1), Iringa (1). **Sudan:** Wau (1). **Spain:** Hispania (no further data) (3). Not traced: W. Africa, Sambia River (1).

**REMARKS.** (i) According to Janse (1932), Prout examined the ♂ types of *T. dataria* and *T. defectaria* in OUM on his behalf and found them to be conspecific with *catalaunaria*.

(ii) The description of *Aspilates occupata* (Walker) is based on 7 syntypes, of which one does not have a patria. The male designated as lectotype above is referable to *catalaunaria*. Janse (1932: 238, 239) indicates that the type series of *occupata* is mixed and contains specimens of *I. deerraria* as well.

**2. *Isturgia triseriata* (Prout, 1926) comb. n.**

Figs 89; 549, 774; 978

*Tephrina triseriata* Prout, 1926b: 186. LECTOTYPE ♂, here designated, [Tanzania]: Lindi, G[erman] E[ast] Africa; *Tephrina triseriata* Prout ♂ type; Rothschild Bequest B.M. 1939–1 (BMNH) [examined]. Paralectotypes (10♂, 1♀). [Tanzania]: *ibidem* (BMNH) [examined].

FORE WING LENGTH. 13–14 mm (♂), 13 mm (♀).

ADULT (Fig. 89). Medium-sized. Antennae of ♂ shortly bipectinate, of ♀, ciliate. Ground colour of wings ochreous, densely dusted and striated with grey; postmedian area with slightly darker suffusion. Basal line present on fore wing only, thin; median line faint; postmedian complete, also fine and weakly angled below costa of fore wing. Discal spots prominent, dark. Postmedian line bordered distally by broad, greyish-brown fascia, broken up into numerous smaller maculae. Underside ochreous, more or less densely striated with greyish brown; dark postmedian fascia ranging from faint to very dark and prominent. Thorax and abdomen concolorous with wings, ochreous-grey. Hind tibia of ♂ not modified. Setal comb on A3 absent.

MALE GENITALIA (Fig. 549). Fairly massive. Uncus broad, hardly pointed apically; gnathos cingulate, prominent. Costa of valve slender, gently curved and not dilated apically; sacculus large, drawn into an acutely pointed, recurved tip. Aedeagus massive, with several cornuti on vesica. Octavals proper absent, but distal margin of A8 sclerotized, as in figure.

FEMALE GENITALIA (Fig. 774). Papillae anales normal. Both pairs of apophyses slender, a. anteriores about half length of a. posteriores. Sterigma: l. antevaginalis somewhat crescentic, a. postvaginalis rounded. Bursa copulatrix resembling a gradually widening tube; posteriormost part of ductus bursae sclerotized; signum small, circular.

DIAGNOSIS. The dark, broken postmedian fascia on the wings is characteristic. The male genitalia of this species, while resembling those of *I. catalaunaria* in structure, are much more robust, particularly the sacculus and aedeagus.

BIOLOGY. Adults were collected in December.

DISTRIBUTION (Fig. 978). Recorded from Tanzania and Zambia. The single specimen from Zimbabwe constitutes a new record for southern Africa.

MATERIAL. 1♂ (dissected, genitalia slide No. 11123) (TM) and 1♀ (dissected, genitalia slide L 663) (NMBZ). 1 Pretoria (TM), 1 Bulawayo (NMBZ).

LOCALITIES. [Zimbabwe]: S[outhern] Rhodesia, Umtali District, Nyanadzi R[iver] (1). Zambia: Siavonga (1).

**3. *Isturgia univirgaria* (Mabille, 1880) comb. n.**

Figs 90, 91; 550, 775

*Tephrina univirgaria* Mabille, 1880: 24. Holotype ♂, Type; Madagascar; *Tephrina univirgaria* Mab. type: [undecipherable]; 1920–1932 coll. L. & J. de Joannis, Muséum Paris; [paper triangle containing abdomen]; *Tephrina univirgaria* Mab. C.R. Soc. ent. Belge 1880, 23 p.XXIV/L'indication, 1♂, coll. H.G. Smith dans la description orig[inale] doit être inexakte d'après J. de Joannis (MNHN) [examined].

[*Tephrina catalaunaria* (Guenée); Hampson, 1908: 477. Misidentification.]

*Tephrina univirgaria* Mabille; Janse, 1932: 242 (under spec. auct.); Herbolut, 1956: 248; 1964: 254; 1972: 144; 1978: 160, 161; 1980: 272.

FORE WING LENGTH. 13–15 mm (♂), 12–15 mm (♀).

ADULT (Figs 90, 91). General appearance plain. Ground colour of wings whitish, densely and evenly striated with pale brownish-grey. Lines practically entirely reduced; in ♀, position of postmedian marked by a row of small spots. Discal spots faint in ♂, well developed in ♀. Underside very similar. Thorax and body concolourous with wings. Hind tibia of ♂ not modified. Setal comb on A3 absent.

MALE GENITALIA (Fig. 550). Uncus triangular, fairly small; gnathos well developed. Costa of valve straight and slightly dilated apically. Sacculus small, pointed, without sclerotizations. Aedeagus long, tapering anteriorly and exhibiting a conspicuous serrated area below tip; vesica bearing a patch of microcornuti. Octavals rectangular, weakly sclerotized.

FEMALE GENITALIA (Fig. 775). Papillae anales very prominent, rounded. Apophyses posteriores slender, a. anteriores markedly stouter, about half as long. Operculum broadly triangular, posterior margin rounded. Bursa copulatrix pear-shaped, with elongated antrum. Corpus bursae rounded, membranous. Signum medium-sized, circular.

DIAGNOSIS. While this species is similar in facies to 1. *I. catalaunaria*, above, it can be separated by its generally lesser size and fainter markings (basal and median line entirely reduced, postmedian at most vestigial). The species are also allopatric (see Distribution).

BIOLOGY. Adults have been collected from December to March. Most records are from the central parts of Madagascar, at altitudes from 1000–1600 m.

DISTRIBUTION. Madagascar and Comoro Islands.

MATERIAL. 32♂ (1 dissected, Geometridae genitalia slide No. 16167) (BMNH) and 50♀ (1 dissected, Geometridae genitalia slide No. 16168) (BMNH). 22 London (BMNH), 39 Paris (MNHN), 4 Pretoria (TM), 17 C. Herbolut collection.

**LOCALITIES.** **Madagascar:** Imerina (11), Nanisana/Tananarivo (11), Parc de Tsimbazaza, 1200 m (35), C., env. Antananarivo (2), C., Massif de Kalambatitra, ca. 40 km SE. of Betroka, SE. of Piton Coté, 1644 m (12), C., Itremo Massive, Haute Ikoly, 415 km NW. of Col de l'Itremo, 1600 m (4), N., contreforts du Tsaratanana, Ht. Sambirano, 1200 m. Bésanetra valley, (1), E., NW. of Fort Dauphin, Andohahelo Massive, Andranomangana Forest, 1770 m (1), N., Montagne d'Ambre, Les Roussettes, 1000 m (1), C., Ankazobe, Fort Ambohitantely (1), C., Ankazomivady, Ambositra, 1640 m (1), Ambatofitorahana, RIG 7 at km 303 (1). **Comoro Islands:** Grande Comore, N'Tsoudjini, 100 m (1).

## 2. *Isturgia sakalava*-group

The wing pattern of the two barely medium-sized species in this group is somewhat reminiscent of *Chiasmia* species (Figs 92–94). Autapomorphies for the group include structure of the valve (sacculus narrow, fused with costa for more than half its length), and the cylindrical antrum, capped by a small operculum, in the female genitalia. Distribution of members of the *I. sakalava*-group is confined to coastal lowland forests of northern KwaZulu-Natal and Madagascar, respectively.

### Key to species

- 1 Adult as in Figs 92, 93. ♂ genitalia (Fig. 551) with tip of sacculus not pronounced. ♀ genitalia (Fig. 776) with relatively narrow antrum; signum small. Northern KwaZulu-Natal (coastal).....  
..... 4. *dukuduku* sp. n., p. 80
- Adult as in Fig. 94. ♂ genitalia (Fig. 552) with tip of sacculus pronounced. ♀ genitalia (Fig. 777) with sturdy antrum and medium-sized signum. Madagascar ..... 5. *sakalava* (Herbulot), p. 80

## 4. *Isturgia dukuduku* sp. n.

Figs 92, 93; 551, 776; 979

**TYPE MATERIAL.** Holotype ♂, [South Africa, KwaZulu-Natal]: Dukuduku [Forest], Zululand, 29.5.[19]79 (N.J. Duke); TM Lep[idoptera] Het[erocera] Genitalia slide No. 10897 (TM). Paratypes (2♂, 1♀). [South Africa, KwaZulu-Natal]: 1♂, *ibidem*, December 1963 (J. Seale); TM Lep. Het. Genitalia slide No. 11062; 1♂, *ibidem*, 20.I.[19]84 (N.J. Duke); 1♀, St. Lucia, Zululand, 2.II.[19]84 (N.J. Duke); TM Lep. Het. Genitalia slide No. 10898 (TM, N.J. Duke collection).

FORE WING LENGTH. 12 mm (♂), 14 mm (♀).

ADULT (Figs 92, 93). Antennae of ♂ bipectinate, of ♀

, simple. Ground colour of wings whitish, completely suffused with ochreous brown; postmedian area slightly darker than rest of wings. All three lines faint and inconspicuous; postmedian relatively best developed, very fine, gently curved below costa of fore wing. Discal spots minute. Postmedian area of both wings with one or several dark grey spots. Underside vividly ochreous, densely striated with grey, particularly in postmedian area. Postmedian line and discal spots faint to moderately well developed. Vestiture of thorax and body concolorous with wings. Hind tibia of ♂ dilated. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 551). Uncus fairly small; gnathos cingulate. Costa of valve straight, not dilated apically. Sacculus somewhat square, about twice width of costa. Saccus well developed. Aedeagus short and rather small, apex pointed; an indistinct median cornutus and a short serration present. Octavals absent.

**FEMALE GENITALIA** (Fig. 776). Papillae anales rounded. Both pairs of apophyses moderately strong, a. anteriores about two-thirds length of a. posteriores. Antrum short and well sclerotized. Bursa copulatrix elongated. Corpus bursae membranous, ductus bursae ribbed, hardly narrower than corpus. Signum small, circular.

**DIAGNOSIS.** While this species cannot be confused with any other African *Isturgia*, there is some similarity to 39. *Chiasmia sororcula*; however, that species has the postmedian line on the fore wing more acutely angled below costa; in addition, the antennae are ciliate in both sexes.

**BIOLOGY.** Apparently a rare species restricted to a small area of indigenous subtropical coastal forest in KwaZulu-Natal. Although much collecting has been done in its two known localities, so far only three specimens are known. These were collected in February, May and December, respectively.

**DISTRIBUTION** (Fig. 979). Restricted to the St. Lucia area in Zululand, northern KwaZulu-Natal, South Africa.

**ETYMOLOGY.** Named after the type locality.

## 5. *Isturgia sakalava* (Herbulot, 1954) comb. n.

Figs 94; 552, 777

*Tephritis sakalava* Herbulot, 1954a: 122. Holotype ♂, Madagascar: Type; Madagascar N.W., Ankrafantsika, env[irons] d'Ampijoroa (P. Viette), 14.xi.1951; [genitalia preparation] 1992; Muséum Paris, Mission P. Viette Sept. 1951 – Mars 1952; *Tephritis sakalava* Holotype; *Tephritis sakalava*

Hrblt. Mém. Inst. Sc. Mad., E, 5, 1954, p.000 (MNHN) [examined].

*Tephrina sakalava* Herbulot; Herbulot, 1956: 248.

FORE WING LENGTH. 11–14 mm (♂), 12–15 mm (♀).

ADULT (Fig. 94). Rather small. Antennae serrated. Ground colour of wings whitish, densely and evenly irrorated with greyish brown. Basal and median line absent or very faint; postmedian present but also indistinct; slightly angled below costa of fore wing. Discal spots faint on fore wing, better developed on hind wing. Postmedian area of both wings with a complete row of dark spots. Underside similar, markings somewhat fainter. Vestiture of thorax and abdomen concolorous with wings. Hind tibia of ♂ lost in holotype. Seta comb on A3 present.

MALE GENITALIA (Fig. 552). Uncus normally developed; gnathos prominent. Costa of valve slightly curved, hardly dilated apically. Sacculus bluntly pointed. Saccus somewhat angular. Aedeagus stout, with a single composite serrated apical cornutus on vesica, as well as a subapical serration. Octavals absent.

FEMALE GENITALIA (Fig. 777). Papillae anales elongated, pointed. Both pairs of apophyses strong; a. anteriores reaching not quite two-thirds length of a. posteriores. Sterigma: l. antevaginalis crescentic, l. postvaginalis not modified. Operculum and antrum prominent, strongly sclerotized. Bursa copulatrix taking the shape of a gradually widening tube; posterior part of ductus bursae with discrete sclerotizations. Signum rather small, situated near centre of corpus.

DIAGNOSIS. A small species of rather nondescript appearance, but characterized, apart from its distribution, by a complete row of dark maculae running along postmedian of both wings.

BIOLOGY. Adults have been collected from November to January at altitudes from 250–390 m. Judging from label data, this is predominantly a forest species.

DISTRIBUTION. Madagascar, apparently absent from eastern parts.

MATERIAL. 8♂ (1 dissected, genitalia slide Herbulot No. 1992 (MNHN) and 16♀ (1 dissected, Geometridae genitalia slide No. 16950 (BMNH)). 2 London (BMNH), 17 Paris (MNHN), 5 C. Herbulot collection.

LOCALITIES. **Madagascar:** N., 37 km S. of Vohémar, Analalava Forest, 25 m (8), Ankarafantsika, Ampijorea station (1), W., Befasy Forest, 45 km S. of Morondava (7), Diego Suarez (2), W., Nat. Road 7, at km 892, Andaromihomaka Forest, 390 m (1), W., Morondava-Ivato road, 62 km E. Morondava, Manamby Forest, 160 m (1), W., N. of Morondava, Marofandilia Forest, 15 m (2), S., Ampanihy, 250 m (1), S., old Tulear-Tangobory road, Sept Lacs, 40 m (1).

### 3. *Isturgia supergressa*-group

This group contains 15 mostly robust species; *I. tenuoa* (Pinker, 1978) from the Canary Islands was excluded from the present study. According to Hausmann (1990), this species is closely related to *I. rubrior* (Hausmann). The group is strongly represented in the Madagascan subregion with four endemic species, but also contains a number of Palaearctic species, which prior to this revision were placed in *Enconista* Lederer. The autapomorphy defining the group is provided by the male genitalia, which are characterized by a stout costa and a large, broadly rounded sacculus.

MALE GENITALIA (Figs 553–563). Uncus triangular to dome-shaped, evenly setose. Gnathos massive, cingulate; medial element folded upwards or drooping. Valve massive; costa somewhat curved, sacculus bluntly pointed or obtuse, practically lacking sclerotizations. Saccus fairly weakly developed, forming a short, broad tip. Aedeagus large relative to size of genitalia and frequently curved. Vesica bearing one or several cornuti or groups of microcornuti only. Octavals absent; in some species central portion of A8 with a very faint sclerotized lip.

FEMALE GENITALIA (Figs 778–791). Papillae anales well developed. Apophyses of average length and thickness; a. anteriores usually rather stout. Sterigma largely unmodified; occasionally l. antevaginalis forming a trapezoidal shield. Operculum present. Antrum greatly developed and totally replacing membranous ductus bursae in some species. Corpus bursae large and rather rounded. Bursa wall membranous, with or without signum or partly spinose and leathery. A parallel condition is found in the Neotropical genus *Thysanopyga* Herrich-Schäffer (Krüger & Scoble, 1992).

### Key to species

- 1 Adults as in Figs 100–112. ♂ genitalia (Figs 556–559) with true cornuti on vesica. ♀ genitalia (Figs 781–787) with partly spinose corpus bursae. Afrotropical region ..... 2
- Adults as in Figs 95–99, 112–118. ♂ genitalia (Figs 553–555, 560–563) without cornuti or with microcornuti only on vesica. ♀ genitalia (Figs 778–780, 788–791) with membranous corpus bursae. Palaearctic region ..... 8
- 2(1) Ochreous species with pointed fore wings (Figs 104, 105). ♂ genitalia (Fig. 557) with sacculus obtuse; aedeagus pointed. ♀ genitalia (Fig. 783) with rounded corpus bursae, exhibiting longitudinal ridges. Widely distributed in Afrotropical region but absent from Madagascar ..... 11. *exospilata* (Walker), p. 86
- Grey or ochreous-grey species with rounded fore wings (Figs 100–103, 106–112). ♂ genitalia (Figs 556, 558, 559), where known, with

- rounded, triangular sacculus; aedeagus blunt apically. ♀ genitalia (e.g., Figs 782, 787) with less evenly rounded corpus bursae, lacking longitudinal ridges ..... 3
- 3(2) Smaller species (fw length 11–14 mm) of ochreous-grey coloration; postmedian area with conspicuous dark marks (Figs 109, 110). ♂ genitalia (Fig. 559) also small; costa of valve hardly curved; arrangement of cornuti on vesica as illustrated. ♀ genitalia as in Fig. 786. Madagascar ..... 14. *averyi* (Viette), p. 88
- Larger species (fw length 12–18 mm), pure grey in coloration; postmedian marks absent or less conspicuous (Figs 100–103, 106–108, 111, 112). ♂ genitalia, where known, and ♀ genitalia not as above. Widely distributed, including several species in Madagascar ..... 4
- 4(3) Adult as in Fig. 103, light ochreous grey. ♂ unknown. ♀ genitalia (Fig. 782) with relatively slender antrum. Somalia ..... 10. *prionogyna* (Prout), p. 86
- Adults as in Figs 100–102, 106–108, 111, 112; mostly darker grey. ♂ genitalia, where known, as in Figs 556, 558. ♀ genitalia (Figs 781, 784, 785, 787) with antrum stouter. Afrotropical region, from Kenya southwards ..... 5
- 5(4) Adults as in Figs 100–102. ♂ genitalia (Fig. 556) with clearly curved costa; gnathos with medial element drooping. ♀ genitalia (Fig. 781) with corpus bursae hardly longer than antrum. Southern to eastern Africa, reaching Kenya in the north ..... 9. *supergressa* (Prout), p. 85
- Adults as in Figs 106–108, 111, 112. ♂ genitalia, where known, with costa less strongly curved and medial element of gnathos folded upwards (Fig. 558). ♀ genitalia with corpus bursae clearly longer than antrum (Figs 784, 785, 787). Madagascar and Comoro Islands ..... 6
- 6(5) Adult fairly dark, slate grey (Figs 111, 112). ♂ unknown. ♀ genitalia (Fig. 787) with short and massive antrum; corpus bursae about 3.5 times length of antrum. Comoro Islands ..... 15. *comorensis* sp. n., p. 89
- Adults usually somewhat paler grey (Figs 106–108). ♂ genitalia, where known, as in Fig. 558. ♀ genitalia (Figs 784, 785) with antrum more elongated. Madagascar and Comoro Islands (2 species), North Africa and Middle East (5 species) ..... 7
- 7(6) Adults as in Figs 106, 107. ♂ genitalia (Fig. 558) as illustrated. ♀ genitalia (Fig. 784) with corpus bursae slightly less than twice length of antrum. Madagascar and Comoro Islands ..... 12. *contexta* (Salmüller), p. 87
- Adult as in Fig. 108. ♂ unknown. ♀ genitalia (Fig. 785) with corpus bursae about 3.5 times length of antrum. Madagascar ..... 13. *modestaria* (Pagenstecher), p. 88
- 8(1) Medium-sized moths (fw length 13–18 mm) of robust build with well developed basal and postmedian line on fore wing (Figs 115–118). Aedeagus with true cornuti (Figs 562, 563). Antrum of ♀ long and funnel-shaped; signum absent (Figs 790, 791) ..... 9
- Medium-sized and slender-bodied (fw length 15–18 mm) or large and robust species (fw length 15–22 mm) with poorly developed basal and postmedian or with prominent postmedian on fore wing only (Figs 95–99, 113, 114). Aedeagus lacking true cornuti. Antrum of ♀ not as above; signum present (Figs 778–780, 788, 789) ..... 10
- 9(8) Moths darker, more brownish in facies (Figs 117, 118). Microcornuti on vesica in a single group; sacculus short (Fig. 563). ♀ genitalia as in Fig. 791. Morocco ..... 19. *rubrior* (Haussmann), p. 92
- Moths paler, more greyish in facies (Figs 115, 116). Microcornuti on vesica in two opposing groups; sacculus markedly longer (Fig. 562). ♀ genitalia as in Fig. 790. Jordan to Israel and Egypt ..... 18. *exustaria* (Staudinger), p. 91
- 10(8) Large and robust species (fw length 15–18 mm) with mottled wings; colour ranging from reddish over different hues of olive to grey; hind wings rounded; lines indistinct (Figs 95–99) ..... 11
- Smaller, more slender-bodied species (fw length 15–22 mm) with unicolorous or at most striated wings; colour grey; hind wings crenulated; lines variously developed (Figs 113, 114) ..... 13
- 11(10) Adults as in Fig. 95, wings strongly irrorated; female fully winged. ♂ genitalia as in Fig. 553; ♀ genitalia as in Fig. 778, with small antrum and large signum ..... 6. *miniosaria duponcheli* (Prout), p. 83
- Adults as in Figs 96–99, wings less strongly irrorated. Females slightly brachypterous (Figs 97, 99). ♂ genitalia as in Figs 554, 555; ♀ genitalia as in Figs 779, 780, with long antrum and small signum ..... 12
- 12(11) Wings with faint postmedian line only; termina of both pairs of wings with distinct rows of black dots (Figs 98, 99); ♀ relatively more brachypterous. ♂ genitalia (Fig. 555) with sacculus long and pointed, ♀ genitalia (Fig. 780) with comparatively delicate antrum; bursa copulatrix pear-shaped ..... 8. *terminipuncta* sp. n., p. 84
- Wings with more prominent postmedian line; black dots along termina weak or absent (Figs 96, 97); ♀ relatively less brachypterous. ♂ genitalia (Fig. 554) with sacculus shorter and blunter,

- ♀ genitalia (Fig. 779) with comparatively robust antrum; bursa copulatrix tubular .....  
..... 7. *hausmanni* sp. n., p. 84
- 13(10) Wings elongated; postmedian on fore wing broken up into minute dots (Fig. 113). ♂ genitalia with long aedeagus, apical portion ribbed (Fig. 560). ♀ genitalia with narrow antrum (Fig. 788)  
..... 16. *beryataria* (Staudinger), p. 89
- Wings shorter; postmedian on fore wing usually well developed (Fig. 114). ♂ genitalia with shorter aedeagus, vesica with a densely convoluted subapical patch (Fig. 561). ♀ genitalia with much wider antrum (Fig. 789)  
..... 17. *spodiaria mizanensis* (Wehrli), p. 90

[6. *Isturgia miniosaria miniosaria* (Duponchel, 1829) comb. n.]

not illustrated

*Scditiona miniosaria* Duponchel, 1829: 368, pl. 160,  
Fig. 4. Type material unspecified [France]: Nord de la France (not traced) [not examined]. The species is widely distributed in western Europe and there is no doubt as to its identity.

*Enconista miniosaria* (Duponchel); Staudinger & Rebel, 1901: 355; Spuler, 1910: 118; Leraut, 1980: 145; Hausmann, 1990: 106.

The nominate subspecies inhabits the eastern Pyrenees, Spain and Portugal (Prout in Seitz, 1915). The dark subspecies *gabriellae* (da Silva Cruz, 1978) was described from southern Portugal. The status of this taxon is briefly discussed in Hausmann & Lenz (1993). The African populations are referable to ssp. *duponcheli* (Prout) which has also been found in parts of Europe (Prout, l.c.).

6a. *Isturgia miniosaria duponcheli* (Prout, 1915) comb. n.

Figs 95; 553, 778

*Fidonia perspersaria* Duponchel, [1830]: 458, pl. 169,  
Figs 1, 2. Type material: [France] (not traced) [not examined]. Nom. praeocc.

*Euconista miniosaria duponcheli* Prout in Seitz, 1915b:  
407 (replacement name for *perspersaria*).

*Enconista miniosaria* v. (ab.) *perspersaria* Duponchel;  
Staudinger & Rebel, 1901: 355; Spuler, 1910: 118.

*Enconista miniosaria* var. *duponcheli* Prout; Wehrli in Seitz, 1940: 655.

*Enconista miniosaria perspersaria* Duponchel, 1829;  
Leraut, 1980: 145 (citing *duponcheli* Prout as synonym).

FORE WING LENGTH. 18–20 mm (♂), 17–22 mm (♀).

ADULT (Fig. 95). A remarkably variable species in regard to coloration and, to a lesser extent, development of the markings. Ground colour of wings cream white, suffused with slate-grey, olive or pinkish-grey, and with dark peppering of varying intensity; the suffusion always much denser on fore wing. Three lines present on fore wing but incomplete to practically reduced and their position in most cases only indicated by three dark maculae on costa of fore wing. Hind wing with a rather broad but ill-defined postmedian fascia only. Discal spots large but not clearly demarcated and faint in some specimens. Underside more homogenous in coloration, cream white and somewhat glossy. Discal spots, postmedian fascia on hind wing, and dark peppering shining through. Vestiture on upperside of thorax and abdomen concolorous with wings, on underside, ochreous-grey. Seta comb on A3 absent; hind tibia of ♂ not modified.

MALE GENITALIA (Fig. 553). Uncus broadly triangular, evenly setose. Gnathos cingulate, prominent. Valve rather massive, with a straight, slightly dilated costa and a triangular sacculus lacking sclerotizations. Aedeagus faintly wedge-shaped, with apical third densely ribbed; vesica without cornuti. Octavals absent.

FEMALE GENITALIA (Fig. 778). Very large, even for the size of the moth. Papillae anales pointed. Both pairs of apophyses strong; a. anteriores approximately two-thirds length of a. posteriores. Sterigma with l. antevaginalis lightly chitinized, boat-shaped. Operculum well sclerotized, tectiform. Antrum slender, as in figure. Bursa copulatrix elongated, pear-shaped; bursa wall membranous and delicate, with a prominent, tear-shaped signum.

EARLY STAGES. I have not seen material of any of the early stages, but Prout in Seitz (1915) provides a description of the mature larva which I translate from the German: 'Caterpillar smooth, evenly cylindrical, dorsum violet-grey with brown dorsal and faint subdorsal line; lateral streak broad, white with yellow maculae; venter more flesh-coloured, with three black lines. A rarer variety is green above.' The pupa is illustrated by Oberthür (1923, Fig. 4459).

DIAGNOSIS. Similar to 8. *Isturgia terminipuncta* sp. n. and 7. *I. hausmanni* sp. n., below. See the diagnoses given for those species. The present species is distinguished from both by the fact that the females are fully winged. Males of some of the darker forms are not unlike those of the Palaearctic *Phigalia pedaria* (F.), the females of which are wingless.

BIOLOGY. Apparently unrecorded, although the species has been reared. Wehrli in Seitz (1940), citing Lhomme, gives *Calicotome spinosa* L., *Ulex* spp., as well as *Genista purgans* L. and *G. scorpius* L. as larval foodplants. Adults have been collected August–September and in November.

**DISTRIBUTION.** From the southern Tyrol and Dalmatia across to southern France and the Iberian peninsula (Hausmann, 1990). In north Africa recorded from Morocco.

**MATERIAL.** 3♂ (1 dissected, ZSBS genitalia slide G 7503) and 3♀ (1 dissected, ZSBS genitalia slide G 7504). 6 Munich (ZSBS).

**LOCALITIES.** **Morocco:** Anti-Atlas, 6 km S. Tleta Akhssas, 1050 m (2); S., Vorsahara-Region, 37 km SE. Bouizkarn, Oase Taghjicht, 550 m (1); Anti-Atlas, Col de Kerdous, SE. Seite, 1150 m (3).

**REMARKS.** In view of the wide range of colour variation observed in this species, it is not surprising that many 'forms' of doubtful validity were named. Several of these are discussed by Wehrli in Seitz (1940).

### 7. *Isturgia hausmanni* sp. n.

Figs 96, 97; 554, 779

**TYPE MATERIAL.** Holotype ♂, [Tunisia]: Tunis, Ariana Djebel, ex] If[arva] 1912 (Dannehl)/Enc[onista] *miniosaria* Dup. [misidentification]; *miniosaria* Dup. ♂ L. Sheljuzhko det. 1948 [misidentification]; ZSBS genitalia slide G 7505 (ZSBS). Paratypes (1♂, 2♀). [Tunisia]: same data as holotype, but without Sheljuzhko's determination label (1♀ dissected, ZSBS genitalia slide G 7506) (ZSBS).

**FORE WING LENGTH.** 17–18 mm (♂), 15–18 mm (♀).

**ADULT** (Figs 96, 97). Robust, in particular the ♀ heavy-bodied and with a tendency to brachyptery. Coloration variable. Ground colour of wings cream white, suffused with pure, olivaceous, or brownish grey, especially on fore wing, and with coarse irroration of varying intensity. Median line absent on fore wing, basal and postmedian faint to clear, slightly zigzagging. Hind wing devoid of lines or at most with trace of postmedian. Discal spots large on fore wing, smaller on hind wing. Underside similar, a little glossy and hardly showing the suffusion on the upperside. Lines absent; discal spots clear. Some specimens with a dark band in postmedian area of both wings. Vestiture of body concolorous with fore wing on upper-, and ochreous grey on underside. Setal comb on A3 absent; hind tibia of ♂ not modified.

**MALE GENITALIA** (Fig. 554). Uncus broadly triangular with reasonably well defined tip, evenly setose; gnathos large, cingulate. Valve elongated; costa recurved and slightly dilated apically; sacculus long, triangular. Aedeagus large relative to rest of genitalia, cylindrical except for attenuated apical region. Posterior portion of vesica appearing granulose; true cornuti absent. Octavals absent.

**FEMALE GENITALIA** (Fig. 779). Strikingly large relative to body size. Papillae anales massive, slightly pointed. Apophyses well sclerotized. Sterigma: 1. antevaginalis crescentic. Operculum as illustrated. Antrum very prominent. Bursa copulatrix taking the shape of an elongated, gradually widening tube. Signum very small, evenly rounded, with very short spicula.

**DIAGNOSIS.** Similar to *Isturgia miniosaria*, above, but smaller, with narrower wings, and especially to *I. terminipuncta* below – see diagnosis under given under that species.

**BIOLOGY.** Although the type series was reared from the larva, no information is available on the foodplant.

**DISTRIBUTION.** Tunisia.

**ETYMOLOGY.** I name this species in honour of Dr Axel Hausmann, of the Zoologische Staatssammlung, Munich, Germany, in recognition of his contribution to the knowledge of the species formerly placed in *Enconista*.

### 8. *Isturgia terminipuncta* sp. n.

Figs 98, 99; 555, 780

**TYPE MATERIAL.** Holotype ♂, [Tunisia]: Tunis, 11.VII., (A. Faller) F[rei]b[ur]g; 58; M. Krüger genitalia slide No. 2 (MAKB). Paratypes (3♂, 1♀). [Tunisia]: same data as holotype; 60; (1♀ dissected, M. Krüger genitalia slide No. 4) (MAKB).

**FORE WING LENGTH.** 18 mm (♂), 14 mm (♀).

**ADULT** (Figs 98, 99). Well medium-sized, robust-bodied moths; ♀ heavy-bodied and slightly brachypterous. Antennae of both sexes bipectinate; in female rami quite short, giving a serrated appearance. Wings broad; ground colour cream-white, densely irrorated with grey and with some greenish suffusion on forewings. Lines reduced or replaced by indistinct shades; on forewings, basal and postmedian lines barely discernible, on hind wings, only postmedian present. Discal spots prominent on both pairs of wings. Cilia concolorous with wings, termen of both pairs of wings with a conspicuous series of black dots. Underside with ground colour chalk-white, densely speckled with greyish-brown, especially on forewings. Postmedian line developed as a prominent dark shade; discal spots large. Black terminal dots present but less conspicuous than on upper side. Vestiture of body concolorous with fore wing on upper-, and ochreous grey on underside. Setal comb on A3 absent; hind tibia of ♂ not modified.

**MALE GENITALIA** (Fig. 555). Uncus broadly triangular, pointed. Gnathos prominent and well sclerotized, the scooped medial element distinct. Genital capsule somewhat hexagonal; saccus extended anteriorly to

about the same distance as the uncus posteriorly. Valvae narrow with slightly recurved costa; sacculus relatively small, pointed. Juxta weak and not clearly defined, between crescentic and semicircular. Aedeagus wedge-shaped, tapering from broad base into a fine point, ribbed in anterior half; vesica lacking cornuti. Octavals absent.

**FEMALE GENITALIA** (Fig. 780). Papillae anales large, setose. Apophyses moderately stout; a. anteriores approximately three-quarters the length of a. posteriores. Sterigma not modified.

Operculum indistinct and weakly sclerotized, semi-circular. Antrum long and slender, well sclerotized. Bursa copulatrix proper pear-shaped, ductus bursae widening gradually into corpus. Signum very small, evenly rounded, with very short spicula.

**DIAGNOSIS.** Similar to *I. hausmanni*, but with the following differences: female smaller relative to male; postmedian line less strongly developed, termen of both pairs of wings conspicuously marked with a series of black dots. In the male genitalia, the sacculus of *terminipuncta* is longer and more pointed; in the female genitalia the clearest differences occur in the shape of the antrum, which is less prominent, and the corpus bursae, which is wider in the present species (compare Figs 554, 555 and 779, 780).

**BIOLOGY.** The type specimens were collected in July.

**DISTRIBUTION.** Tunisia.

**ETYMOLOGY.** The name refers to the characteristic black dots present along the wing termen.

### 9. *Isturgia supergressa* (Prout, 1913) comb. n.

Figs 100–102; 556, 781; 979

*Tephritis supergressa* Prout, 1913: 215. Holotype ♀ [South Africa, Gauteng]: Pretoria, Pienaarsriver, VIII. 1902 (Swierstra); 504. *unicum*; *Tephritis supergressa* Prout ♀ type; *Tephritis supergressa* Prout Type No. 2414 ♀ (TM) [examined]. Paratype (1 ♀). [South Africa, Northern Province]: Three Sisters, 22. Feb[ruary] 1911 (A.J.T. Janse); *Semiothisa* [sic] *supergressa* Prout Cotype No. 2206; *Tephritis supergressa* Prout ♀ cotype (TM) [examined].

*Tephritis supergressa* Prout; Janse, 1917: 112; 1932: 236; Pinhey, 1975: 87.

**FORE WING LENGTH.** 15–16 mm (♂), 16–18 mm (♀).

**ADULT** (Figs 100–102). Large and robust, with apex of fore wings rounded. Antennae of both sexes bipectinate, those of ♂ with longer pectinations. Ground colour of wings whitish, moderately to very densely

irrorated with grey; postmedian area somewhat darker grey. Markings strongly reduced; basal and median line absent or vestigial, postmedian line occasionally well developed, but more often also reduced. ♂ specimens mostly with a large, round black spot in postmedian area of both wings. Underside similar, but darker, the grey irroration more intense. Thorax and abdomen ochreous, with fine grey dusting. Hind tibia of ♂ not modified. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 556). Uncus with tip arising from broad base; gnathos massive. Costa of valve slender, curved and slightly dilated apically. Sacculus long, triangular, with rounded apex. Aedeagus massive, curved and tapering anteriorly; vesica bearing two large, nail-like cornuti. Octavals absent.

**FEMALE GENITALIA** (Fig. 781). Papillae anales well developed, slender. Both pairs of apophyses thin; a. anteriores about half length of a. posteriores. Sterigma not modified. Operculum with emarginate distal margin. Antrum funnel-shaped, very large and ribbed throughout. Corpus bursae large, one side densely spinose, the other membranous.

**EARLY STAGES.** The species has been reared by N.J. Duke in captivity, but no description is available.

**DIAGNOSIS.** 11. *Isturgia exospilata*, below, is similar, but has the apex of the fore wing markedly more pointed and the postmedian line on the fore wing straight, not curved.

**BIOLOGY.** The larva feeds on *Mundulea sericea* (Willd.) Chev. (Papilionoidea). *Isturgia supergressa* is distributed throughout southern Africa, but apparently never common. Adults have been collected from January–July and from September–December.

**DISTRIBUTION** (Fig. 979). In South Africa widespread in the Transvaal and the northern parts of KwaZulu-Natal province; also reported from Swaziland. Further occurring in a band between 17° and 22°S across northern Namibia, Botswana, Zimbabwe, and Moçambique, reaching Kenya and Tanzania in the north.

**MATERIAL.** 48♂ (4 dissected, TM genitalia slides No. 952, 11000; genitalia slide No. 17) (ZMHB), genitalia slide No. 8 (coll. C. Herbulot) and 68♀ (1 dissected, TM genitalia slide No. 11001). 16 London (BMNH), 1 Berlin (ZMHB), 16 Bulawayo (NMBZ), 47 Pretoria (TM), 2 Pretoria (SANC), 1 Cape Town (SAM), 7 Windhoek (SMWN), 12 C. Herbulot collection, 13 N.J. Duke collection, 1 H.S. Staude collection.

**LOCALITIES.** **South Africa, Transvaal:** [Gauteng]: Johannesburg (1), Pretoria (2), Suikerbosrand Nature Reserve (1), Cullinan/Pretoria (1), Renostervloort, Bronkhorstspruit District (3), Boekenhoutskloofdrift (1). [Mpumalanga]: Pretoriuskop (1), Nelspruit (1),

Berlin Forestry (1), Klipfontein (1), Matjulwana (1). [Northern Province]: Rooiberg (1), Ofcolaco (1), Wyllie's Poort (1), Three Sisters (1), Slypsteendrift/ New Smitsdorp (1), Tzaneen (1), Malati Park/Tzaneen (1), Nylsvley (3), Marieps Mtn (1), Nylstroom (3); Kruger National Park: Nyandu Bush (1), Letaba Camp (1), Punda Milia (2). Ambiguous: Griffin Mine (1). **KwaZulu-Natal:** Mtubatuba (1), Magude (1), Dukuduku Forest (1), Jozini Dam (3), Chaos/Mkuze (1). **Swaziland:** Mpisi (1), Malagwane Hill/Mbabane (3). **Namibia:** Abachaus (11), Okahandja (2), Oruvandjei, 8 m W. Kaoko Otavi (1), Grünfelde, Otjosondou District (6), Kharixas, Welwitchia (1), Omatako[ranch] (1), Tamsu Pan, Kungveld (1). **Zimbabwe:** Wankie (1), Khami/Bulawayo (8), Bulawayo (1), Mazoe (1), Vumba (1), S. of Chitrapadzi (2), Msali Bridge (1). **Botswana:** Sepopa, Ngamiland (1), Kalahari (1). **Moçambique:** Dondo Forest (2). **Kenya:** Kapsabet (2), Kibwezi (9), Mgana (1), Makindu, S. of Nairobi (1), Mutha (10), Musthomo (1). **[Tanzania]:** (Deutsch Ost Afrika), Bumbuli (1), Usambara, Korogwe (1), Amani, Usambara (1), Moa, 30 m N. Tanga, sea coast (1).

## 10. *Isturgia prionogyna* (Prout, 1916) comb. n.

Figs 103, 782

*Tephrina prionogyna* Prout, 1916b: 161. Holotype ♀, [Somalia]: Somaliland, Mandera (OMU) [not examined]. See Remarks. Paratypes (2♀). 1♀, *ibidem*. 1♀, [Somalia]: May 9 1909, Somaliland, Mandera, 47 m SW. of Berbera, 3000 f[ee]t, open & bush. Pres[ented] 1913 W. Feather; Co-type, t in BM, L.B. Prout 1914–15; Mandera May 9/09 [handwritten]; *Tephrina prionogyna* Prout ♀cotype; Genitalia slide Geom[etridae] 1951–208; L.B. Prout Coll. BM 1939–643 (BMNH) [examined] (BMNH). See also Remarks.

FORE WING LENGTH. 15 mm (♀ paratype).

ADULT ♀(Fig. 103). Large. Costa of fore wing nearly straight. Ground colour of wings cream white, striated with mouse grey, much more heavily so in postmedian area. Basal and postmedian lines greatly reduced, median better developed, also grey. Discal spots present but faint. Upperside otherwise plain. Underside similar, but contrast between dark grey postmedian area and rest of wings even stronger. Vestiture of thorax and abdomen concolorous with wings.

FEMALE GENITALIA (Fig. 782). Papillae anales normal. Both pairs of apophyses strong, a. anteriores barely more than half length of a. posteriores. Sterigma not preserved in examined specimen. Operculum well sclerotized, with emarginate distal margin. Antrum long and also well chitinized. Corpus bursae rounded, the spinose area large.

DIAGNOSIS. Externally quite similar to 9. *Isturgia supergressa*, above, and best separated by the structure of the genitalia: in *I. prionogyna*, the bursa copulatrix and especially the antrum appears shorter. However, distributional data should aid identification as *supgressa* has not been recorded further north than Kenya.

BIOLOGY. Presumably an inhabitant of arid savanna. Adults have been collected in May at an altitude of 1000 m.

DISTRIBUTION. Somalia.

MATERIAL. Known from the types only.

REMARKS. (i) The holotype of *prionogyna* was not examined, but as one of the paratypes seen bears the same label data as the holotype I have no doubt as to the identity of the species. One of the female 'paratypes' cited above is not mentioned in Prout's original description.

## 11. *Isturgia exospilata* (Walker, 1861) comb. n.

Figs 104, 105; 557, 783; 980

*Panagra exospilata* Walker, 1861: 987. Holotype ♂, South Africa: Type; S[outh] Africa, Knysna; 4.

*Panagra exospilata* (BMNH) [examined].

*Tephrina ansorgei* Warren, 1898b: 253. Holotype ♂,

[Uganda]: Kampala, I.[18]97, dry s[eason] (Dr Ansorge); *Tephrina ansorgei* Warr. Type ♂; Type; Rothschild Bequest B.M. 1939–1 (BMNH) [examined].

*Tephrina exospilata* (Walker); Swinhoe, 1904: 512;

Hampson, 1910: 468; Janse, 1917: 112; 1932: 237; Prout, 1932a: 482; Fletcher, 1958b: 129; 1963: 22.

*Tephrina ansorgei* Warren; Janse, 1932: 237 (synonymy); Fletcher, 1958b: 129 (as synonym of *exospilata*).

FORE WING LENGTH. 14–16 mm (♂), 15–17 mm (♀).

ADULT (Figs 104, 105). Medium-sized, with apex of fore wing acutely pointed. Antennae bipectinate in ♂, ciliate in ♀. Ground colour of wings cream-white to ochreous, densely dusted with grey. Proximal half of postmedian area darker, greyish brown. Basal and median line usually present on fore wing only, but faint and indistinct. Postmedian line well developed, fine and nearly straight on both wings and bordered proximally by yellow. Discal spots absent. Frequently a dark circular spot present in postmedian area of both wings. Underside similar, but with orange-brown suffusion along costa and in postmedian area. Postmedian line faint, dark spots absent. Thorax and abdomen greyish ochreous. Hind tibia of ♂ not modified. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 557). Uncus rounded; gnathos strongly developed. Costa of valve large and curved, hardly dilated apically. Sacculus prominent, massive and somewhat truncated. Saccus large, broadly triangular. Aedeagus large and cylindrical, bearing two very large cornuti. Octavals absent.

**FEMALE GENITALIA** (Fig. 783). Papillae anales normal. Apophyses posteriores thin; a. anteriores much stouter, about half length of former. Operculum very small. Antrum very large, fluted. Corpus bursae large and rounded, unevenly spinose, with conspicuous longitudinal carinae.

**DIAGNOSIS.** Easily recognized on account of its pointed fore wings and the straight postmedian line on both wings.

**BIOLOGY.** Although originally described from the southern Cape Province, the species clearly has its centre of distribution along the KwaZulu-Natal coast. It is, however, nowhere common. Adults have been collected in January–May, July–August and in October–November.

**DISTRIBUTION** (Fig. 980). Widely distributed in the Afrotropical region from Ethiopia southwards. In southern Africa largely confined to eastern parts of KwaZulu-Natal and Transvaal provinces and Zimbabwe.

**MATERIAL.** 44♂ (2 dissected, TM genitalia slides No. 948, 11010) and 35♀ (1 dissected, TM genitalia slide No. 11011), 14 London, 2 Paris (MNHN), 1 Berlin (ZMHB), 4 Munich (ZSBS), 26 Pretoria (TM), 3 Cape Town (SAM), 13 Bulawayo (NMBZ), 9 N.J. Duke collection, 1 D.M. Kroon collection, 1 H.S. Staude collection, 5C. Herbulot collection.

**LOCALITIES.** **South Africa, Transvaal:** [Mpumalanga]: Nelspruit (1), Pretorius Kop (1). [Northern Province]: Ofcolaco (1), Mariepskop (1), Magoebaskloof (3), Buzzard Mountain Retreat, Soutpansberg (1). **KwaZulu-Natal:** no further data (1), Umgazi River Mouth (1), Krantzkloof (2), Drakensberge, Cathedral Peak Hotel (2), Tongaat (1), Inchanga (2), Durban (2), Pinetown (1), Karkloof (2), Impetyeni Forest (2), Jozini Dam (1), Nkandla Forest (1), Umzimvubu Park (1), Stanger (1), Verulam (1). **Cape Province:** [Western Cape]: Knysna (1). [Eastern Cape]: Beacon Bay (3), Umtata (1), Port St. John's (4).

**Moçambique:** Delagoa Bay (1). **Zimbabwe:** Mutare (Umtali) District (1), Vumba (7), Bulawayo (1), Christon Bank (1), Harare (Salisbury) (3), Chirinda Forest (1). **Malawi:** Bvumbwe (1), Mt. Mlanje (3), Mlanje plateau, 6500 ft (3), Nyassa (2), Nyassaland, no further data (1). **Zambia:** Mwinilunga (1). **Tanzania:** Songea, Litembo, 1500 m (1), Kigonsera (2), Kipengere Range, 2050 m, Ikonda (1). **Kenya:** Nairobi (2). **Uganda:** Ruwenzori, Mobuku Valley, 7800 ft (1), N. of Fort

Portal, top of escarpment, 4700 ft (1), N. Ruwenzori, 6–8500 ft (1). **Ethiopia:** Choa, Debré Zeit, 1800 m (1). **Zaire:** Elisabethville (1). **Cameroon:** Manengouba village, 1040 m (1). **Angola:** Quicolungo, 120 km N. of Lucala (1).

## 12. *Isturgia contexta* (Saalmüller, 1891) comb. n.

Figs 106, 107; 558, 784

*Tephrina contexta* Saalmüller, 1891: 498; Fig. 275. (Holo)Type ♀, **Madagascar:** Nossi-Bé (not traced in SMF (H. Schröder *in litt.*) [not examined]. Saalmüller's illustration is sufficient to establish the identity of the species.

*Tephrina caeca* Saalmüller, 1891: 498; Fig. 266. (Holo)Type ♂, [Madagascar]: Nossi-Bé (not traced in SMF (H. Schröder *in litt.*) [not examined]. Saalmüller's illustration shows this to be the ♂ of *contexta*.

*Tephrina contexta* Saalmüller; Pagenstecher, 1907: 96; Herbulot, 1956: 248; 1978: 161.

*Tephrina caeca* Saalmüller; Pagenstecher, 1907: 96 (as good species); Janse, 1932: 239 (as synonym of *deerraria*); Herbulot, 1956: 248 (as synonym of *contexta*).

**FORE WING LENGTH.** 12–16 mm (♂), 14–15 mm (♀).

**ADULT** (Figs 106, 107). Antennae of ♂ bipectinate, those of ♀ ciliate, shaft rather stout. Sexes dimorphic. ♂: Basal and median area of wings ochreous grey, postmedian area mouse-grey, entire surface with sparse darker dusting. Basal and median line and discal spots very faint. Postmedian line well developed, straight, bordered proximally by yellow. A conspicuous blackish, round spot in postmedian area of each wing. ♀: Ground colour of wings whitish, densely and coarsely irrorated with grey; postmedian area grey, with same irroration. All markings greatly reduced, only discal spots on hind wing and dark spots in postmedian area of fore wing discernible. Underside of both sexes cream-white with grey irroration, markedly heavier in ♀; postmedian area ochreous grey, markings faint. Thorax and abdomen concolorous with wings, ochreous grey. Hind tibia of ♂ slightly dilated. Setal comb on A3 present.

**MALE GENITALIA** (Fig. 558). Uncus and gnathos as described for the group. Valve elongated; costa gently curved and hardly dilated apically. Sacculus comparatively narrow, apex rounded. Aedeagus large and curved, with a truncated tip. Vesica bearing two long cornuti, surrounded by a large number of denticles. Octavals very weakly sclerotized.

**FEMALE GENITALIA** (Fig. 784). Papillae anales prominent. Both pairs of apophyses long and rather massive. Sterigma not modified. Antrum well developed, slightly

tapering anteriorly; corpus large, somewhat angular, one half of bursa wall densely spinose. Signum absent.

**DIAGNOSIS.** In facies, this species approaches 23. *Isturgia deerraria* rather closely; it is distinguished, however, by the straight postmedian line (slightly convex in *deerraria*) and the presence of dark spots in the postmedian area. Furthermore, the two species are allopatric, *I. contexta* being restricted to Madagascar.

**BIOLOGY.** Occurring commonly throughout Madagascar from sea level to 1200 m, with most records from around 500 m. Adults have been collected in all months except September.

**DISTRIBUTION.** Madagascar and Comoro Islands. Further reported from Pemba Island, British East Africa (Kenya) (Pagenstecher, 1907: 96). The specimens were not seen and this record requires confirmation.

**MATERIAL.** 37♂ (1 dissected, Geometridae genitalia slide No. 16165) (BMNH) and 25♀ (2 dissected, Geometridae genitalia slide No. 16166) (BMNH); genitalia slide G 7500 (ZSBS). 22 London (BMNH), 20 Paris (MNHN), 1 Munich (ZSBS), 19 C. Herboulot collection.

**LOCALITIES.** **Madagascar:** no further data (1), Diego Suarez (14), Mananjara (5), Mananjary (2), S., Lac Tsimanampetsotsa (2), S., road Tuléar-Ihosy, km 64 (1), S. Tuléar (6), Ifaty/Tuléar (1), W., Befasy Forest, 45 km S. of Morondava (1), Perinet, Analamazaotra (1), Station Perinet (1), W., Zombitsy Reserve, E. of Sakaraha, Matsabory, 640 m (2), W., N. of Morondava, Marofandilia Forest, 15 m (1), W., Nat. Road 7, 64 km E. of Tuléar, Andranovory Forest, 500 m (1), S., env. Tuléar, plateau SE. of Miary, 40 m (3), S., W. border of Mahafaly plateau, 5 km E. of Itampolo, 40 m (4); S., Mahafaly plateau, 12 km W. of Ankalirano, 250 m (1), S., Batroka (1), E., Sambava-Andapa road, Belalona, 100 m (1), E., Lakato road at km 10, Ambodiriana, 1050 m (1), N., Haut Sambirano road, 10 km from Ambanja, Col du Bakaka, 140 m, (1), Centre, La Mandraka, 1200 m (1), Centre, Ankazobe, Ambohitantely Forest (1). **Comoro Islands:** Moheli (2), Moheli, Miringoni (5), Mayotte (1), Grande Comore, N'Tsoudjini 5 km N. Moroni (1).

### 13. *Isturgia modestaria* (Pagenstecher, 1907) comb. n.

Figs 108; 785

*Macaria modestaria* Pagenstecher, 1907: 96. Holotypus ♀, **Madagascar:** Typus: 77859; O[st]-Madagaskar, Ile aux Prunes, Tamatave (Voeltzkow S.); *Macaria modestaria* Pagenst.; Pr[éparation] No. 4017 C. Herboulot; Zool[ogisches] Mus[eum] Berlin (ZMHB) [examined].

*Semiothisa modestaria* (Pagenstecher); Herboulot, 1956: 249.

FORE WING LENGTH. 14 mm (♀ holotype).

**ADULT ♀** (Fig. 108). (Description from rather worn holotype.) Of medium size. Ground colour of wings whitish ochreous, densely striated with grey; postmedian area somewhat darker, more brown-grey. Basal and median lines absent, postmedian very distinct, fine. Discal spots present but inconspicuous, wings devoid of other markings. Underside very similar. Thorax and abdomen grey-brown.

**FEMALE GENITALIA** (Fig. 785). Papillae anales medium-sized. Apophyses moderately strong, a. anteriores about two-thirds length of a. posteriores. Antrum well developed but slender. Corpus bursae large, one side densely spinose.

**DIAGNOSIS.** The genitalia of the ♀ are very close to those of *I. contexta*, above. They differ in that the corpus bursae is somewhat longer and that the spinose area extends further anteriorly.

**DISTRIBUTION.** Madagascar.

**MATERIAL.** Known from the holotype only.

**REMARKS.** In the absence of more material, particularly males, of *I. modestaria* it remains doubtful whether this taxon is specifically distinct from *I. contexta*. In view of the slight differences in the female genitalia they are, nevertheless, treated as good species here.

### 14. *Isturgia averyi* (Viette, 1980) comb. n.

Figs 109, 110; 559, 786

*Tephrina averyi* Viette, 1980: 33. Holotype ♂, **Madagascar:** Holotype; Madagascar Sud-ouest, Amboasary, 220 m, Ambovombe, 19.VI.[19]57 (P. Griv[eaud]); Genitalia ♂ P. Viette Prép. No. 5630; P.E.L. Viette det. 1978 *Tephrina averyi*n.sp. Holotype P. Viette (MNHN) [examined].

FORE WING LENGTH. 11–14 mm (♂), 12–13 mm (♀).

**ADULT** (Figs 109, 110). Small. Antennae of ♂ bipectinate, of ♀, simple. Ground colour of wings cream-white to pale ochreous with grey striations; postmedian area predominantly grey. All three lines present on fore wing of ♂, but median not clearly defined and more like a fascia; on hind wing, only postmedian well developed. In ♀, lines greatly reduced and only vestigially present. Postmedian area of both wings with a conspicuous, round, dark spot. Underside ochreous grey with faint (♂) or moderate (♀) brown striations, postmedian area slightly darker, brownish grey. Vestiture of thorax and body ochreous, with faint grey dusting. Hind tibia of ♂ dilated, bearing hair-pencil. Setal comb on A3 present.

**MALE GENITALIA** (Fig. 559). Uncus relatively elong-

gated; gnathos prominent. Costa of valve slightly curved near middle and not dilated apically. Sacculus rather small, triangular. Saccus broadly triangular. Aedeagus large compared with rest of genitalia, curved. Vesica with two cornuti in apical half. Octavals proper absent, but central portion of A8 somewhat more densely sclerotized.

**FEMALE GENITALIA** (Fig. 786). Papillae anales normal. Both pairs of apophyses relatively short; a. anteriores stouter, reaching two-thirds length of a. posteriores. Antrum stout, funnel-shaped; corpus bursae squarish, with one side of wall densely spinose. Signum absent.

**DIAGNOSIS.** The species is fairly easily recognized externally by its lesser size compared with the other members of this group, and the presence of a conspicuous dark spot in the postmedian area of all four wings. Differences in genitalia structure can be seen from the illustrations.

**BIOLOGY.** *Isturgia averyi* is apparently associated with rather arid habitats; label data describe one locality as *Euphorbia* and Dielireaceae-bush. Recorded altitudinal range 10–640 m.

**DISTRIBUTION.** Madagascar, restricted to southern and southwestern parts.

**MATERIAL.** 22♂ (1 dissected, genitalia slide M. Krüger No. 3) (ZMHB) and 5♀ (2 dissected, genitalia slide M. Krüger No. 4) (ZMHB), genitalia slide M. Krüger No. 20 (MNHN)). 3 Berlin (ZMHB), 20 Paris (MNHN), 4 C. Herbulot collection.

**LOCALITIES.** **Madagascar:** SW., Tulear (3), SW Madagaskar (1), S., 14 km S. de Beloha, Lavanona road (1); S., Rés. nat. int. 10, Lake Tsimanampetsotsa (1), S., Ifotaka (1), S., W. of Beheloka, 20 m (3), S., 14 km S. of Beloha, Lavanono road (3), S., RNI 10, Lake Tsimanampetsotsa (3), S., W. border of Mahafaly plateau, 5 km E. of Itampolo, 40 m (5), S., cordon littoral Mahafaly, env. Efoetsy, 10 m (2), SW., Amboasary, 220 m, Ambovombe (1), W., Zombitsi matsabory reserve, 640 m (2), W., Nat. Road 7, 64 km E. of Tulear, Andranovory Forest, 500 m (1).

**REMARKS.** One ♂ from Tulear in ZMHB bears a handwritten label, ‘nach der Abbildung nicht *T. caeca* sondern ähnlich *F. martinaria* Ob. Et. I-IV’. This assertion is based on a misidentification.

### 15. *Isturgia comorensis* sp. n.

Figs 111, 112; 787

**TYPE MATERIAL.** Holotype ♀. [Comoro Islands]: Grande-Comore, 1884 (L. Humblot); Ex Oberthür Coll. Brit. Mus. 1927-3.; Geometridae genitalia slide No.

16941 (BMNH). Paratypes (7♀). [Comoro Islands]: same data as holotype (BMNH).

**FORE WING LENGTH.** 14 mm (♀ holotype).

**ADULT ♀** (Figs 111, 112). Medium-sized. Antennae serrated, pale ochreous. Ground colour of wings cream white, evenly suffused with grey, leaving basal area of hind wing paler, and irrorated with darker grey. Postmedian area of both wings deep mouse-grey. Basal and median line entirely reduced; postmedian also very thin. Discal spots small, blackish grey. A dark, round, ill-defined spot in postmedian area of fore wing, below discal spot. Underside similar, but grey irroration coarser. Vestiture of thorax and abdomen grey.

**FEMALE GENITALIA** (Fig. 787). Papillae anales prominent, elliptical. Apophyses moderately stout, a. anteriores about two-thirds length of a. posteriores. Operculum and antrum massive. Corpus bursae large, with an extensive spinose area.

**DIAGNOSIS.** In habitus, the ♀ is very much like 12. *I. contexta* and 13. *I. modestaria*, above. The genitalia are also similar, although *I. comorensis* has the operculum and antrum more massive, while the spinose area of the corpus bursae is larger.

**BIOLOGY.** Unknown. Adults have been collected in December.

**DISTRIBUTION.** Comoro Islands, recorded from Grande Comore, Moheli, and Anjouan.

**ETYMOLOGY.** Named after the type locality of this endemic species.

**FURTHER MATERIAL.** 2♀ (1 dissected, TM genitalia slide No. 11257). 2 Pretoria (TM).

**LOCALITIES.** **Comoro Islands:** Moheli, Fomboni (1), Anjouan (1).

### 16. *Isturgia berytaria* (Staudinger, 1892) comb. n.

Figs 113; 560, 788

*Halia berytaria* Staudinger, 1892: 200. LECTOTYPE ♂, here designated, [Lebanon]: Origin[al]; [Beirut]; Zool[ogisches] Mus[eum] Berlin [in duplicate]; *Enconista berytaria* Stgr. ♂, G[enital] P[räparat] 90ZMB2, det. W. Sauter 1990 (ZMHB) [examined]. Paralectotype ♀, [Lebanon]: Origin[al]; [Beirut] (ZMHB) [examined]. Further paralectotypes in ZMHB (B. Krutzsch, pers. comm.) [originally described from 9♂, 2♀].

*Itame berytaria* (Staudinger); Prout in Seitz, 1915: 401; Wehrli in Seitz, 1940: 396; Hausmann, 1991: 137.

*Enconista berytaria* (Staudinger); Sauter, 1992: 161.

FORE WING LENGTH. 17–18 mm (♂), 15–18 mm (♀).

ADULT (Fig. 113). Of somewhat more slender build than the type species. Fore wings acutely pointed, hind wings with termen crenulated. Ground colour of wings cream white, evenly suffused with mouse grey and with some darker grey irroration in postmedian area. Fore wings with three dark maculae (the basal one of which is very faint) on costa, indicating the position of the lines. Basal and median line otherwise entirely reduced; postmedian broken up into a series of very fine striae. Discal spots blackish, elongated and very prominent on fore wing, and grey, round and weak on hind wing. The latter markingless except for discal spot and basal and/or postmedian shining through from underside. The underside more lively patterned: ground colour grey with more extensive dark grey irroration; apex of fore wing and entire hind wing with greyish-brown suffusion. Basal and median line also absent; postmedian better developed, especially on hind wing, zigzagging. A thin white streak running across hind wing. Vestiture of thorax and abdomen whitish grey to grey. Hind tibia of ♂ not modified. Setal comb on A3 absent.

MALE GENITALIA (Fig. 560). Uncus broadly triangular with distinct tip, evenly setose. Gnathos cingulate, large. Valve massive with gently curved, apically somewhat dilated costa and small, triangular sacculus with well-rounded tip. Saccus produced into a short point. Aedeagus wedge-shaped, strongly curved and with apical third densely ribbed; vesica lacking cornuti. Octavals absent.

FEMALE GENITALIA (Fig. 788). Papillae anales large, rounded. Apophyses strong, in particular a. anteriores. Sterigma: l. ante vaginalis not modified; l. postvaginalis extensive, with a convoluted structure. Antrum prominent, long. Post-antrum portion of ductus very short and immediately widening into the rounded corpus bursae. Bursa wall very thin. Signum circular, situated in middle of corpus and bearing several setae.

EARLY STAGES. Wehrli *in Seitz* (1940) repeats the following description of the egg by Wiltshire (1936) ‘elongate-oval, light green, later changing in colour to grey.’ The adult larva is described as ‘smooth, very faintly setose, dark green or greyish brown; in the first case with a faint lateral line below the whitish stigmate behind which there is a row of short, black, horizontal streaks situated in reddish-brown shades, and with a dotted, dark grey dorsal line with pale borders and yellowish subdorsal with darker borders. The greyish-brown form possesses much sharper lines and differently coloured feet.’

DIAGNOSIS. Like 17. *I. spodiaria mizanensis*, below, this species is of rather *Itame*-like general aspect and was indeed still included in that genus by Wehrli *in*

*Seitz* (1940), who had apparently not seen the genitalia. *Isturgia spodiaria* is also the only species with which confusion might occur; see diagnosis given below.

BIOLOGY. The larvae are reported to feed at night on *Calicotome villosa* near the coast; they are frequently parasitized by the ichneumonid *Cymodusa antennator* Hlg. (Wehrli *in Seitz*, 1940). Adults have been collected October–December.

DISTRIBUTION. Syria and Palestine; Cyprus (Rebel, 1939, cited after Wehrli *in Seitz*; this reference could not be traced); Crete.

MATERIAL. 5♂ (1 dissected, ZSBS genitalia slide G 7513) and 3♀ (1 dissected, ZSBS genitalia slide G 7514). 6 Bonn (MAKB), 2 Munich (ZSBS).

LOCALITIES. Israel: N. Tirza (1); Nahal Tirza (1). Syria: Djerin, Libanon occ. (2); Beyruth (2); no further data (1). Crete: Bpili (1).

#### [17. *Isturgia spodiaria spodiaria* (Lefèbvre, 1831) comb. n.]

not illustrated

*Fidonia* (?) *spodiaria* Lefèbvre, 1831: class 9, plate 8.

Type material: not stated [Europe] (not traced) [not examined]. The identity was established from the illustration.

*Fidonia semicanaria* Freyer, 1832: 145. Type material: not stated but apparently 7♀ syntypes. Sicily (not traced) [not examined].

*Selidosema cerataria* Guenée, [1858]: 146. Holotype ♂, [Sicily]: Messina (Messine), April (M. Zeller) (not traced) [not examined].

*Selidosema semicanaria* (Freyer); Guenée, [1858]: 147.

*Itame spodiaria* Lefèbvre; Prout *in Seitz*, 1915: 401; Audeoud & Roch, 1938: 368.

*Itame semicanaria* (Freyer); Wehrli *in Seitz*, 1940: 396 (synonymy).

*Itame cerataria* (Guenée); Wehrli *in Seitz*, 1940: 396 (synonymy).

*Enconista spodiaria* (Lefèbvre); Sauter, 1992: 161.

The nominate subspecies is found in southern Italy, Sicily and probably also southern Spain (Prout *in Seitz*, 1915b). The populations inhabiting Palaearctic Africa (Mauritania, Tunisia, Morocco) were described by Wehrli (1940) as ssp. *mizanensis*.

#### 17a. *Isturgia spodiaria mizaneusis* (Wehrli, 1940) comb. n.

Figs 114; 561, 789

*Itame spodiaria mizanensis* Wehrli *in Seitz*, 1940: 396. Holotype ♂, [Morocco]: Maroc, Mrassine (H.

Powell) [sic] Avril 1921; Eclosion 8 Avril 1921, chenille en Janvier sur *Calycotone*, Beni Amar [handwritten]; *mizanensis* Wehrli, *Itame spodiaria* Lef. ♂ Holotype; *mizanensis* Wehrli, *Itame spodiaria* Lef. abgebildet Seitz IV. Suppl[ement] Fig. (ZFMK) [examined by D. Stünning].

*Itame spodiaria* (Lefèvre) *sensu* Prout, 1928d: 119; Zerny, 1936: 92.

FORE WING LENGTH. 15–17 mm (both sexes).

ADULT (Fig. 114). Medium-sized, with a relatively slender body and crenulated hind wings. Ground colour of wings cream, suffused with mouse grey (suffusion darker in postmedian area, especially on fore wing), and with additional darker grey irroration, more heavily developed in ♀. Fore wing with basal and postmedian line, the latter strongly developed and angled below costa (basal may be weak in ♂ and both lines are weaker in ♀); hind wing without lines. Discal spots grey, elongated and large on fore- and small and rounded on hind wing. Underside similar in both sexes, grey with intense grey-brown irroration and striation, particularly on apex of fore wing and on entire hind wing. Fore wing with discal spot and traces of postmedian shining through; hind wing with prominent discal spot and median and postmedian line developed into dark fasciae. The postmedian fascia occasionally very wide. Vestiture of thorax and abdomen concolorous with wings, light grey and upperside, mixed with darker scales on venter. Hind tibia of ♂ not modified; setal comb on A3 absent.

MALE GENITALIA (Fig. 561). Uncus broadly triangular with well defined tip, evenly setose. Gnathos cingulate. Valves with long, straight, apically not strongly dilated costa and small, acutely pointed sacculus. Sacculus forming a short, stout point. Aedeagus curved, finely pointed; vesica with a densely convoluted subapical patch but lacking true cornuti. Octavals absent.

FEMALE GENITALIA (Fig. 789). Papillae anales large compared with size of genitalia. Apophyses robust, notably a. anteriores. Sterigma with crescentic l. antevaginalis. Operculum as illustrated. Antrum very wide. Bursa copulatrix pyriform with small, circular signum; bursa wall membranous, delicate.

EARLY STAGES. According to Wehrli (*loc. cit.*), the mature larva is illustrated in Oberthür (1923) and is described as (translated) ‘green with white lateral line below which it is speckled with red and black; claspers red. It is thought to resemble closely the green form of the larva of *Enconista miniosaria duponcheli* Prout, but is much smaller, having the head much less densely speckled with black.’ Wehrli mentions a further illustration of the larva in *Bullet. Soc. Ital.* 62: 108, 109.

DIAGNOSIS. With its grey coloration and slender build this species is not unlike 16. *I. berytaria*, above, but is

at once recognizable by its shorter wings and angled postmedian line on the fore wing. The male genitalia (Figs 560, 561) are closely similar and best separated by differences in the arrangement of sclerotizations on the vesica. In the female genitalia, *s. mizanensis* may be recognized by its more strongly rounded bursa copulatrix and smaller antrum.

BIOLOGY. In Algeria, the larva has been reported to feed on *Calicotome spinosa*; adults have been collected from late May to end of July (Wehrli in Seitz, 1940). The examined moths cited below were collected March–May and in July; Wehrli in Seitz (*loc. cit.*) mentions two generations from early April to early June and again September to early October.

DISTRIBUTION. Palaearctic Africa (Algeria, Mauritania, Tunisia, Morocco).

MATERIAL. 33 ♂ (1 dissected, ZSBS genitalia slide G 7507) and 10 ♀ (1 dissected, ZSBS genitalia slide G 7508). 8 Munich (ZSBS), 35 Bonn (MAKB).

LOCALITIES. **Morocco:** Haut Atlas, Oukaimeden, 2400–2700 m (2); 20 km E. Agadir-Inesgane (2). **Mauritania:** C., Atlas major, ca. 1900 m (2). **Tunisia:** Atteia (1); Djouggar Mts (1). **Algeria:** Hammam Righa (22); Bône (8); Guelma (5).

### 18. *Isturgia exustaria* (Staudinger, 1897), comb. n.

Figs 115, 116; 562, 790

*Selidosema exustaria* Staudinger, 1897: pl. IV, Fig. 36.

Type material: not stated, but apparently 4 ♂ 2 ♀ syntypes. 3 ♂ and 2 ♀, [Israel]: Jordantal (J. Paulus). 1 ♂, [Israel]: Gebirge Moab, nordöstlich vom Todten Meer (ZMHB). LECTOTYPE ♂, here designated, [Israel]: [Jordantal]; Origin[al]; Zool[ogisches] Mus[eum] Berlin [in duplicate]; *Enconista exustaria* Stgr., G[enital] P[räparat] 90ZMB3, det. W. Sauter 1990 (ZMHB) [examined]. Paralectotype ♀, [Israel]: Origin[al]; 9/11; Jordantal [18]95 (Paulus); Zool[ogisches] Mus[eum] Berlin (ZMHB) [examined]. Further paralectotypes in ZMHB (B. Krutzsch, pers. comn.).

*Enconista (Selidosema) exustaria* Staudinger, 1898: 315 [description – see Remarks].

*Enconista exustaria* Staudinger; Prout in Seitz, 1915: 407 (partim); Andres & Seitz, 1925: 61; Audeoud & Roch, 1938: 368 (Mogador; probably misidentification); Wiltshire, 1949: 427, 1990: 136; Hausmann, 1990: 106, 1991: 138; Sauter, 1992: 161.

FORE WING LENGTH. 16 mm (♂), 18 mm (♀).

ADULT (Figs 115, 116). A fairly robust species, the ♀

being appreciably larger, with fainter markings. Ground colour of wings chalk white, intensely but somewhat unevenly striated with greyish-brown. Fore wing of ♂ with basal and postmedian line strongly developed, very dark brown and undulating, median line reduced; of ♀, with all three lines present but exceedingly faint; however, postmedian, as in ♂, bordered distally by an indistinct dark fascia. Hind wing of both sexes without lines. Discal spots well developed on fore wing but faint on hind wing. Underside chalk white with fairly even greyish striations; postmedian fasciae and discal spots shining through. Hind tibia of ♂ not modified; setal comb on A3 absent.

**MALE GENITALIA** (Fig. 562). Uncus broadly triangular, finely pointed. Gnathos cingulate. Valve with recurved, apically dilated costa and narrowly triangular, pointed sacculus. Saccus forming a broadly rounded tip. Aedeagus relatively small, anterior end truncated, apex pointed. Vesica with two opposing groups of microcornuti. Octavals absent.

**FEMALE GENITALIA** (Fig. 790). Papillae anales and apophyses as in other members of the group. Sterigma not modified. Operculum cone-shaped. Antrum strongly developed, subcylindrical. Bursa copulatrix relatively small, wall membranous and very delicate; signum absent.

**EARLY STAGES.** Although the species has been reared (see under Biology), no description of the early stages is available.

**DIAGNOSIS.** Similar to *I. rubrior*, below, but generally lighter. The two species are allopatric, so that locality data are important in identification. The differences in genitalia structure can be seen from the figures (compare Figs 562, 563 and 790, 791).

**BIOLOGY.** In Israel, the larva has been reared on *Retama* (= *Genista*) *raetam* Webb ex Berth. (Sauter, 1992). Adults have been collected in November and December.

**DISTRIBUTION.** Throughout Jordan; in Israel distributed from the Jordan Valley in the north through Moab and the Sinai to Egypt (Hausmann, 1990); Saudi Arabia (Wiltshire, 1990).

**MATERIAL.** 1♂ (dissected, ZSBS genitalia slide G 7509) and 3♀ (2 dissected, ZSBS genitalia slides G 7510, 7515). 3 Munich (ZSBS), 1 Bonn (MAKB).

**LOCALITIES.** **Israel:** Totes Meer Nordufer (1); Totes Meer, En Gedi; S., Yotvata (1); C., Enot Zugim (1).

**REMARKS.** As explained in the footnote on p. I of volume 10 of the *Deutsche Entomologische Zeitschrift Iris*, pages 1–184 and plates I–VI (forming Heft I) were published on 27 July 1897, while Heft 2 with pages 185–412 and plates VII–XII appeared on 2 Janu-

ary 1898. The illustration of *Selidosema exustaria* on plate IV fulfils the requirements of Article 12 of the Code as a valid indication, and the publication date of this species is therefore 1897.

### 19. *Isturgia rubrior* (Hausmann, 1990) comb. n.

Figs 117, 118; 563, 791

*Enconista rubrior* Hausmann, 1990: 108; Figs 1, 2, 8, 12. Holotypus ♂, **Morocco:** (Maroc), Essaouira, 21.IV.1969, collection Jacques Plante; genitalia slide No. 1771 (ZSBS) [not examined]. Paratypes (15♂, 22♀) as listed in original description (ZSBS, MAKB, Sommerer collection, Munich), plus one ♀ labelled as 'Allotype': **Morocco:** (SW-Marokko), Sous-Mündung, 26.II.[19]75, leg[it] G. Rheinwald; genitalia slide Hausmann No. 3482 (MAKB) [only paratypes listed under 'Material' examined].

[*Enconista exustaria* Staudinger *sensu* Prout in Seitz, 1915b: 407 (*partim*). Misidentification.]

**FORE WING LENGTH.** 13 mm (♂), 17 mm (♀).

**ADULT** (Figs 117, 118). Medium-sized and of robust build; female markedly larger. Ground colour of wings cream, suffused and striated with greyish-brown. Central portion of fore wing of both sexes, but particularly of ♂, obfuscated with dark brown. Fore wing with undulating basal and postmedian, more strongly developed in ♂; hind wing without lines. Discal spots prominent and elongated on fore- and faint and rounded on hind wing. Underside whitish to cream with intense, coarse greyish-brown irroration. Discal spots well developed on both wings. Lines not visible but postmedian area with a broad, dark fascia intersected by veins. Vestiture of thorax and abdomen dirty ochreous, mixed with dark scales. Hind tibia lost in examined ♂ but presumably simple; setal comb on A3 absent.

**MALE GENITALIA** (Fig. 563). Uncus triangular, evenly setose; gnathos cingulate. Costa of valve recurved and weakly dilated; sacculus small and triangular. Saccus not protruding far beyond valvae and not forming a tip. Aedeagus small, slightly curved; vesica exhibiting a subapical group of microcornuti. Octavals absent.

**FEMALE GENITALIA** (Fig. 791). Large for the size of the moth. Papillae anales massive. Apophyses strong, a. anteriores stouter. Sterigma not modified. Antrum large, funnel-shaped. Bursa copulatrix resembling an elongated, gradually widening tube. Signum absent.

**DIAGNOSIS.** The species resembles 18. *I. exustaria*, above, but is more brownish; the two species are also allopatric. For the differences in genitalia structure I refer to the figures.

**BIOLOGY.** Adults have been collected in November.

DISTRIBUTION. Moroccan coast from Tanger to the mouth of the Sous (Hausmann, 1990).

MATERIAL. Paratypes: 1♂, 1♀, Morocco: Maroc, Agadir-Rokeln, 2–21.11.1974, leg. Friedel (dissected, ZSBS genitalia slides G 7511, 7512) (ZSBS).

#### 4. *Isturgia disputaria*-group

With eleven constituent species, the *I. disputaria*-group is also fairly species-rich; next to the *I. presbitaria*-group, it includes the most derived members of the genus (see Phylogeny). The synapomorphies defining the group are provided by the genitalia: in the ♂, these include a dome-shaped uncus and combination of a needle-like, and a broader, blade-like cornutus on the vesica. In the ♀, the group is characterized by the rather long antrum with prominent, transverse sclerotized bands. The group is widely distributed throughout the savanna biome, but has only one representative in Madagascar.

**MALE GENITALIA** (Figs 564–573). Uncus dome-shaped, evenly setose. Gnathos angular. Costa of valve slender to rather massive, usually slightly curved and somewhat dilated apically. Sacculus triangular, outer margin finely serrated in some species. Saccus forming a usually well-defined tip. Aedeagus subcylindrical and mostly slender; vesica with a combination of a needle-like and a broader, blade-like cornutus. Octavals fairly shallow, inner margin frequently scobinate.

**FEMALE GENITALIA** (Figs 792–802). Papillae anales narrow (e.g., Fig. 801) to fairly large (e.g., Fig. 792). Apophyses slender. Sterigma: lamella antevaginalis mostly well developed and broadly crescentic in shape. Lamella postvaginalis not modified. Operculum present. Antrum well developed. Bursa copulatrix short and pear-shaped (e.g., Fig. 796) to elongated and tubular (e.g., Fig. 801). Membranous part of ductus in most species bearing discrete sclerotized patches. Signum fairly small (e.g., Fig. 798) to large (e.g., Fig. 799), with numerous long spicula. The female genitalia in this group may show considerable intraspecific variation in shape of the corpus bursae, shape and size of the signum and development of the apophyses.

#### Key to species of the *disputaria*-group

- 1 Moths with more or less heavy blackish streaks across fore wing (Figs 119–122). ♂ genitalia with valves short (Figs 564, 565); ♀ genitalia as in Figs 792, 793 ..... 2
- Moths with fore wings not so marked (Figs 123–140); ♂ genitalia with longer valves (e.g., Fig. 567). ♀ genitalia (Figs 794–802) not as above ..... 3
- 2(1) Fore wing with dark streak prominently developed (Figs 121, 122). ♂ genitalia (Fig. 565) with termen of sacculus convex; octavals rounded. ♀ genitalia (Fig. 793) with crescent-shaped lamella postvaginalis; ductus bursae very short. Ethiopia and Somalia ..... 21. *netta* (Holland), p. 95
- Fore wing with dark markings variously developed (Figs 119, 120). ♂ genitalia (Fig. 564) with termen of sacculus straight; octavals pointed. ♀ genitalia (Fig. 792) with l. postvaginalis broader; ductus bursae longer. India to Saudi Arabia; Tunisia and Egypt; south of the Sahara in Nigeria, Ethiopia and Kenya ..... 20. *disputaria* (Guenée), p. 94
- 3(1) Small species (fw length 10–13 mm) (Figs 129–131, 138, 139). ♂ genitalia (Figs 568, 569, 573) with long, slender costa. ♀ genitalia (Figs 796, 797, 801) variable in size but with concave distal margin to operculum ..... 4
- Small to medium-sized species (fw length 9–16 mm) (Figs 123–128, 132–137, 140). ♂ genitalia (Figs 566, 567, 570–572) with shorter, stouter costa. ♀ genitalia (Figs 794, 795, 798–800, 802) with distal margin of operculum not concave ..... 6
- 4(3) Dark species (Fig. 131). ♂ genitalia (Fig. 569) with aedeagus relatively stouter; octavals pointing outwards. ♀ genitalia (Fig. 797) as illustrated; bursa copulatrix of moderate length. Madagascar ..... 25. *griveaudi* sp. n., p. 100
- Paler species. ♂ genitalia (Figs 568, 573) with aedeagus very thin; octavals not pointing outwards. ♀ genitalia (Figs 796, 801) with bursa copulatrix clearly shorter or longer than above. African mainland ..... 5
- 5(4) ♂ genitalia (Fig. 568) with costa of valve straight; sacculus rounded. ♀ genitalia (Fig. 796) with short, pear-shaped corpus bursae. Tanzania ..... 24. *pygmaeata* sp. n., p. 100
- ♂ genitalia (Fig. 573) with costa of valve slightly curved; sacculus somewhat pointed. ♀ genitalia (Fig. 801) with strongly elongated corpus bursae. Northern and eastern Africa, recorded from Somalia, Djibouti, northern Nigeria, Ethiopia, Kenya and Tanzania; Arabian Peninsula (Yemen) ..... 29. *quadriplaga* (Rothschild), p. 103
- 6(3) Relatively small, dark moths (fw length 9–11 mm) (Figs 132, 133). ♂ genitalia as in Fig. 570; octavals with broad tips. ♀ genitalia (Fig. 798) with short and rounded bursa; signum small. Middle East (Israel, Lebanon) through Arabia (Saudi Arabia, Bahrain) to southern India (Karachi and Hyderabad) ..... 26. *pervaria* (Lederer), p. 101
- Mostly larger, paler moths (fw length 9–16 mm) (Figs 123–128, 134–137, 140). ♂ genitalia, where known (Figs 566, 567, 571, 572) not as above, octavals with tips pointed or, if rounded, with strikingly different cornuti on vesica. ♀ genitalia (Figs 794, 795, 799, 800, 802) with bursa longer or, if of similar length, differently shaped signum and operculum. Throughout the study area ..... 7
- 7(6) ♂ genitalia (Fig. 571) with saccus elongated;

- aedeagus with characteristic configuration of cornuti; octavals rounded. ♀ genitalia (Fig. 799) with short, stout bursa and very large signum. Middle East (Israel) and Arabia (Saudi Arabia, Yemen) to Ethiopia and Tanzania .....  
..... 27. *sublimbata* (Butler), p. 101
- ♂ genitalia (Figs 566, 567, 572) with saccus shorter, or, if elongated, with different configuration of cornuti and pointed octavals. ♀ genitalia (Figs 794, 795, 800, 802) with bursa somewhat more elongated or, if similarly short, with smaller signum. Mostly African mainland ..... 8
- 8(7) ♂ antennae bipectinate; moths rather dark grey, with well developed lines (Figs 123, 124). ♂ and ♀ genitalia as in Figs 566, 794. Cape Province .....  
..... 22. *exerraria* (Prout), p. 96
- ♂ antennae ciliate; moths paler grey, with weaker lines (Figs 125–128, 136, 137, 140). ♂ and ♀ genitalia (Figs 567, 572 and 795, 800, 802) not as above. One species also in Cape Province, the others distributed further north ..... 9
- 9(8) ♂ genitalia (Fig. 572) with short and rounded sacculus, elongated saccus and scobinate octavals. ♀ genitalia (Fig. 800) with bursa wall finely ribbed throughout. Kenya and Tanzania .....  
..... 28. *arizela* (Fletcher), p. 102
- ♂ genitalia, where known, with sacculus longer, saccus shorter and stouter and octavals not scobinate (Fig. 567). ♀ genitalia (Figs 795, 802) with bursa wall membranous ..... 10
- 10(9) Wings relatively shorter (Figs 125–128). ♂ genitalia as in Fig. 567; ♀ genitalia (Fig. 795) variable in shape of bursa and size of signum. Throughout Africa; Spain; Saudi Arabia .....  
..... 23. *deerraria* (Walker), p. 97
- Wings relatively more elongated (Fig. 140). ♂ unknown. ♀ genitalia (Fig. 802) with bursa more elongated. Coastal districts of Senegal .....  
..... 30. *inaequivirgaria* (Mabille), p. 103

## 20. *Isturgia disputaria* (Guenée, [1858]) comb. n.

Figs 119, 120; 564, 792

*Eubolia?* *disputaria* Guenée, [1858]: 489. Holotype ♂, Egypt: Zell[er] Coll. 1884; *Disputaria*; Aegypt. don. Löw [18?54]; Genitalia slide Geom[etridae] 1951–195 (BMNH) [examined].

*Eubolia* *disputaria* Guenée; Walker, 1862: 1439; Staudinger & Rebel, 1901: 354; Rebel, 1931 [1907]: 101.

*Macaria?* *strenuata* Walker, [1863]: 1647. LECTOTYPE ♂, here designated, [India]: Punjab/ 54 14; *Macaria?* *strenuata*; Geometridae genitalia slide No. 9881 (BMNH) [examined]. **Syn. n.** The second syntype, a ♂, was not located in BMNH [not examined].

- Aspilates indotata* Walker, [1863]: 1681. Holotype ♂, [India]: N[orth] India/48 131; *Aspilates indotata* (BMNH) [examined]. **Syn. n.**
- Fidonia martinaria* Oberthür, 1876: 61, pl. 4, Fig. 8. Syntype ♂, Algeria: Biskra [indecipherable]; *Fidonia martinaria* Ob. type; vu par Staudinger Catalogue 1900 (MAKB) [examined]. **Syn. n.**
- Tephrina lithina* Butler, 1883: 171. LECTOTYPE ♀, here designated, [?India]: Kurrachee 83.66 (623), 7.80/*Tephrina lithina* Butler type; Genitalia slide Geom[etridae] 1951–894 (BMNH) [examined]. **Syn. n.**
- Tephrina lithina* Butler; Swinhoe, 1884: 527 (as good species).
- Tephrina granitalis* Butler, 1883: 171. LECTOTYPE ♀, here designated, [?India]: Mhow, 83.66, 9.81/*Tephrina granitalis* Butler type; Genitalia slide Geom[etridae] 1951–198 (BMNH) [examined]. **Syn. n.**
- Tephrina zebrina* Butler, 1883: 171. LECTOTYPE ♀, here designated, [?India]: Mhow, 83.66 (509A), 3.82/*Tephrina zebrina* Butler type; Genitalia slide Geom[etridae] 1951–202 (BMNH) [examined]. **Syn. n.**
- Tephrina infriktaria* Swinhoe, 1885: 861. LECTOTYPE ♀, here designated, [India]: Poona, 87.28 (1164) 10.82/*Tephrina infriktaria* C. Swinhoe type; Genitalia slide Geom[etridae] 1951–196 (BMNH) [examined]. **Syn. n.**
- Macaria granitalis* (Butler); Swinhoe, 1885: 861 (as good species).
- Macaria lithina* (Butler); Swinhoe, 1885: 861 (as good species).
- Macaria zebrina* (Butler); Swinhoe, 1885: 861 (as good species).
- Fidonia martinaria* Oberthür; Demaison, 1895: 61 (as good species).
- Tephrina disputaria* (Guenée); Hampson, 1895: 209; Swinhoe, 1904: 511; Warren & Rothschild, N.C., 1905: 28; Aurivillius, 1910: 37; Prout, 1916b: 160; Rothschild, L.W., 1921: 217; Andres & Seitz, 1924: 80; Audeoud & Roch, 1938: 356, 368; Wehrli, 1940: 401; Rungs, 1954: 3, 1981: 263; Wiltshire, 1980a: Figs 16, 16a; 1990: 135; Hausmann, 1991: 138.
- Tephrina subocellata* Warren, 1896: 413. Holotype ♂, [Yemen]: S[heik] Othman, Arabia, 21.4.[18]95; Rothschild Bequest B.M. 1939–1.; Geometridae genitalia slide No. 9882; *subocellata* Warr. 1896 ♂ type (BMNH) [examined]. **Syn. n.**
- Diastictis disputaria* (Guenée); Swinhoe, 1900: 272. [*Semiothisa* *disputaria* (Guenée); Janse, 1932: 219. Misidentification.]
- Eubolia* *disputaria* var. *darmouini* Dumont, 1932: 697. Holotype ♂, [Algeria]: Type; Bled Tahla, 8.XI.[19]28; 1932 coll. C. Dumont Muséum Paris; *Tephrina* *disputaria* Guenée v. *darmouini* [sic] nova; *Eubolia* *disputaria* Guenée var. *darmouini* Dum.,

Livre du Centen. Soc. entom. Fr., 1932 p.697 (Cl. Herbulet v. 1953) (MNHN) [examined].

*Eubolia disputaria* var. *hachia* Dumont, 1932: 697.

Holotype ♀, [Algeria]: Bled Tahla, ex larva on *Acacia tortilis* (MNHN?) [not examined].

*Lithina rippertaria* ab. *nigrescente* D. Lucas, 1948: 88.

'Holotype': sex no longer determinable, **Tunisia**: Sfax, 4.XII.1946; Type décrit dans la Bulle[ti]n [de la] S[ocié]té Entomologique de France 1947; *Lithina rippertaria* ab. *nigrescente* D. Lucas Holotype; Coll. D. Lucas C[laude] H[erbulet] aeq. 1952 (C. Herbulet collection) [examined]. See Remarks.]

FORE WING LENGTH. 12 mm (♂), 14 mm (♀).

ADULT (Figs 119, 120). Relatively small, with pointed fore wings, particularly the ♂. Ground colour of wings cream white, irregularly striated with brown; postmedian area darker, greyish brown. In ♂, all three lines present on fore wing, very heavily blackish-brown in lower half of wing, then becoming fainter to absent towards costa. On hind wing, basal line absent; median line faint to absent; postmedian line present, but very fine. ♀ generally with much more reduced and incomplete markings. Discal spots not well developed. Underside pale ochreous without striations or dusting in ♂ and with faint dusting in ♀; in ♂, median line and a postmedian fascia present, both light brown. Thorax and body ochreous with light grey dusting. Hind tibia of ♂ dilated, bearing hair-pencil. Setal comb on A3 present. Variation: Large, blackish-brown suffused examples are referable to ab. *darmouni* (Dumont)

MALE GENITALIA (Fig. 564). Uncus and gnathos as described for the group. Valve comparatively short and massive; costa gradually tapering; sacculus pointed. Aedeagus long and slender, pointed apically, dorsal region below apex sclerotized; vesica bearing two cornuti. Octavals furcate with prominent tips; their inner margin serrated.

FEMALE GENITALIA (Fig. 792). Papillae anales large. Both pairs of apophyses strong; a. anteriores about two-thirds length of a. posteriores. Sterigma broadly crescentic. Operculum rounded. Antrum prominent. Bursa copulatrix elongated, pear-shaped; ductus bursae well sclerotized locally, corpus membranous. Signum well developed, with long and irregular spicula.

EARLY STAGES. I have not had any material before me. The larva supposedly has been described by Chrétien (1909), but this reference could not be traced.

DIAGNOSIS. Well-marked males are easily recognized by their slightly ochreous coloration and the very heavy lines on the fore wing. The ♀, however, cannot be reliably separated from other small and pale *Isturgia* species using external characters and dissection of the genitalia is recommended. Compared with *I. pervaria* (Fig. 798), the bursa copulatrix of *disputaria* is mark-

edly longer, whereas that of *I. quadriplaga* (Fig. 801) is even more strongly elongated.

BIOLOGY. The species is adapted to arid conditions. Adults were collected in November (Algeria), February (Saudi Arabia, Nigeria) and May and July (Tunisia). The larva has been recorded as feeding on *Acacia tortilis* (Dumont, 1932). Rebel (1931: 101) records that *I. disputaria* was observed flying in full sunshine in grassy places near Aden.

DISTRIBUTION. Palaearctic Africa, recorded from Algeria, Tunisia and Egypt. Saudi Arabia to India. South of the Sahara in northern Cameroon, Nigeria, Ethiopia and Kenya.

MATERIAL. 55♂ (2 dissected, Geometridae genitalia slides No. 9884, 16159) (BMNH) and 31♀ (1 dissected, Geometridae genitalia slide No. 16160) (BMNH). 25 London (BMNH), 38 Bonn (MAKB), 3 Vienna (NHMW), 1 Bulawayo (NMBZ), 17 C. Herbulet collection.

LOCALITIES. **Arabia**: Wadi Mizbil (5), Shaib Sudair (2). **Saudi Arabia**: Jidda (1), Mecca (1). **Tunisia**: Sfax (2), Tozeur (5). **Ethiopia**: Debré Zeit, 1800 m (1). **Nigeria**: Gadau (1). **Cameroon**: Waza (38). **Kenya**: Marigat, Aberdare Mts (1). **Yemen**: Aden (3). **Algeria**: Biskra (10), Gommier/Biskra (2), El-Outaya (1), Rharis (3). **[Algeria]**: Bled Tahla (1). **Not traced**: Sahara or., Enneri Marmar (4), Takoukout, Damergou (3).

REMARKS. As noted by Herbulet (1984a), the holotype of *Lithina rippertaria* ab. *nigrescente* D. Lucas is of indeterminate sex and consists of a pair of fore wings of *Isturgia disputaria* which have been glued to a body of *Asmate rippertaria* (Duponchel).

## 21. *Isturgia netta* (Holland, 1897) comb. n.

Figs 121, 122; 565, 793

*Gramnodes netta* Holland in Donaldson-Smith, 1897: 418. Holotype ♀, [Somalia]: Brit[ish] Somaliland, Hargesa, July 18 1894 (not located, lost?) [not examined].

*Tephrina netta* (Holland); Prout, 1916b: 166.

FORE WING LENGTH. 12 mm (♂), 13 mm (♀).

ADULT (Figs 121, 122). Of medium size. Ground colour of wings pale ochreous with some grey dusting, particularly in ♂. Basal and median line developed into massive black streaks that do not reach costa. Postmedian line also black, becoming finer towards costa and very nearly reaching it. Postmedian bordered distally by a greyish-brown fascia. Discal spots minute or absent. Hind wing plain except for a faint greyish postmedian fascia. Underside ochreous with some darker dusting in ♂; markings shining through. Thorax and abdomen ochreous. Hind tibia of ♂ not modified. Seta comb on A3 absent.

MALE GENITALIA (Fig. 565). Uncus and gnathos as described for the group. Valve short and compact; costa straight, not widening towards apex. A very small bulge present between costa and sacculus (? valvula). Sacculus angular, with apex drawn into a very short point. Aedeagus curved, widest near apex; vesica with two cornuti as illustrated. Octavals large and arcuate, with blunt tips.

FEMALE GENITALIA (Fig. 793). Papillae anales rounded. Both pairs of apophyses fairly strong; a. anteriores reaching two-thirds length of a. posteriores. Sterigma: l. antevaginalis crescentic. Operculum semi-circular. Ostium wide, opening into short and wide antrum. Bursa copulatrix pear-shaped; signum large.

DIAGNOSIS. Very strikingly marked and bearing some resemblance to *I. disputaria*, above, and also to 132. *Chiasmia subcurvaria araps* on account of the prominent black streaks across the fore wing. The genitalia are distinctive.

BIOLOGY. The species is adapted to dry habitats. Adults have been collected in April and June.

DISTRIBUTION. Ethiopia and Somalia.

MATERIAL. 1♂ (dissected, Geometridae genitalia slide No. 16923) (BMNH) and 1♀ (dissected, Geometridae genitalia slide No. 16924) (BMNH). 2 London (BMNH).

LOCALITIES. **Ethiopia:** Dire Daoua (2).

## 22. *Isturgia exerraria* (Prout, 1925) comb. n.

Figs 123, 124; 566, 794; 981

*Tephrina exerraria* Prout, 1925: 593. LECTOTYPE ♀, here designated, [South Africa, Western Cape]: Clanwilliam (Lightfoot), 11. [18]99; *Tephrina deerraria* small race [misidentification]; L. Prout Determ[inavit] (SAM) [examined]. Paralectotype (1♀). [South Africa, Western Cape]: *ibidem*, dated 1898; *Tephrina deerraria* Walk. ♀ (dwarf race); *Tephrina exerraria* Prout (see p. 593, Ann[als] [of the] S[outh] Afr[ican] Mus[eum] XIX; L. Prout Determ[inavit] (SAM) [examined]. See also Remarks.

*Tephrina deerraria* Walker, 1861: 962 *partim*. See Remarks.

[*Semiothisa disputaria* (Guenée); Janse, 1932: 219; Taylor, 1965: 147. Misidentification.]

*Tephrina exerraria* Prout; Janse, 1932: 239.

FORE WING LENGTH. 12–15 mm (♂), 9–15 mm (♀).

ADULT (Figs 123, 124). Small and rather dark in facies. Antennae of ♂ bipectinate, of ♀, simple. Ground colour of wings whitish, heavily suffused with

ochreous-grey to grey and with dense darker dusting. Postmedian area usually darker grey, particularly in ♂. All lines present on fore wing of ♂, though basal and median vary greatly in development; postmedian usually well developed on both wings, fine, gently curved below costa. In ♀, usually all lines greatly reduced or totally absent but postmedian faintly present in some examples. Discal spots inconspicuous, grey. Underside whitish with faint brown suffusion and dense, pale grey-brown striations. Discal spots and postmedian line weakly developed, other markings absent; postmedian area darker. Thorax and abdomen greyish to greyish-ochre. Hind tibia of ♂ not modified. Seta comb on A3 absent.

MALE GENITALIA (Fig. 566). Uncus and gnathos as described for the group. Costa of valve slender, straight, occasionally faintly dilated apically. Sacculus prominent, margin rounded in most specimens (rarely pointed), with a small, discrete sclerotization. Saccus ending in broad tip. Aedeagus comparatively large, widest near middle and with apical portion dorsally sclerotized and striated. Vesica with one smooth and one scobinate, blade-like cornutus. Octavals fairly shallow, with inner margin strongly sclerotized.

FEMALE GENITALIA (Fig. 794). Papillae anales normal. Apophyses posteriores slender; a. anteriores much shorter and stouter, of slightly varying length. Sterigma not modified. Antrum prominent, broadly funnel-shaped. Bursa copulatrix pear-shaped to rather elongated; ductus well sclerotized over most of its surface; corpus membranous. Signum large and circular, with long spicula.

EARLY STAGES. The following description of a mature larva, collected at Wilderness (33°59'S 22°35'E), is taken from Taylor (1965): 'the larva is leaf-green with a yellow lateral line which becomes white on the last four abdominal segments and which continues down the claspers where its centre is pink. The body is lighter ventrally and the head is also lighter with reddish-brown markings, giving a maculated appearance. Short and scattered setae occur and the length is 28 mm'. Taylor further states that 'Pupation takes place in a loose cocoon among leaves on the soil surface, which probably is normally found under debris. The pupal period occupies 19 days in November'.

DIAGNOSIS. The ♂ can be separated from other, similar species of *Isturgia* with bipectinate antennae such as 32. *I. spissata* by its darker grey coloration. Distributional data should also prove helpful, since *I. exerraria* is restricted to the Cape Province in South Africa. In the ♀, confusion is likely with small and poorly marked specimens of 23. *I. deerraria*, 28. *I. arizela* and a few related species. Dissection of the genitalia, together with distributional data, however, permits reliable identification.

**BIOLOGY.** See under Early stages, above. The species occurs mostly in the fynbos and mountainous areas of the Cape Province, but has also been found, though less numerous, in the semiarid areas of the north-western part of the province. The larva has been reared on *Pterocelastrus tricuspidatus* (Lam.) Sond. (Celastraceae) (Taylor, 1965); in the Western Cape it is occasionally a pest on rooibos (*Aspalathus linearis* (Burm. f.) Dahlg. (Fabaceae). Adults have been collected from January to March, in June, and from August to December.

**DISTRIBUTION** (Fig. 981). South Africa south of 28°S, with most records from the Cape Province west coast.

**MATERIAL.** 116♂ (9 dissected, TM genitalia slides No. 2714, 10988, 11004, 11014, 11067, 11068, 11071, 11072, 1158) and 95♀ (8 dissected, TM genitalia slides No. 10989, 11005, 11073, 11159–62; slide L 696 (NMBZ)). 16 Bulawayo (NMBZ), 181 Pretoria (TM), 7 Cape Town (SAM), 7 NJD collection.

**LOCALITIES.** **South Africa, Cape Province:** [Western Cape]: Montagu (2), Jonkershoek (25), Plettenberg Bay (1), Noordhoek, Cape Peninsula (1), Betty's Bay (2), Rooiberg/Robertson (1), Houtbaai (1), Cape Town (1), Kliphuiselei/ Swartbergpas (3), Swartbergpas (1), Worcester (27), Klaver (1), Sedgefield (1), Klein Klipheuvel (3), Grootzwart Berg, 12 m S. Klaver (1), Algeria Forestry, Clanwilliam District (12), Clanwilliam (19), Grootvaderbos, Heidelberg District (5), Saasveld (5), De Wet, Orange Grove (2), De Wet (1), Knysna (4), Kogelberg Nature Reserve (2), Suider Paarl (3), Malmesbury (3), Touws River (1), Hottentots Huisie (1), De Hoek near Piquetberg (1), Piketberg (1), nr. Mamre (2), Morreesburg (1), Leipoldville (1), Porseleinberg, S. of Riebeekskasteel (4), Redelingshuys (1), Darling (2), Yzerfontein (1), Citrusdal (2), Stellenbosch (2), Storms River Bridge (1). [Eastern Cape]: Red House (3), Port Elizabeth (12), Groot River Pass (1), Tsitsikama, De Plaat Forest (2), Addo Bush (2), East London (4). [Northern Cape]: Studer's Pass, Garies (1), Springbok (11), P.K. LeRoux Dam, Van der Kloof (1), Klippaap (1), Brakfontein (4), Nababiep (1), Eksteenfontein Valley, Richtersveld (1), Alexander Bay (1), Soebatsfontein (13), Kleinmond (1), Van Rhyn's Pass (1). **KwaZulu-Natal:** Abrahamskraal (1), Howick (1).

**REMARKS.** In the original description of *exerraria*, Prout gives the material as 'Cape Province: Clanwilliam, a long series in coll. South African Museum and coll. L.B. Prout'. Of these, only two specimens, designated as lectotype and paralectotype above, could be traced in SAM, while a further three from the Prout collection are in BMNH. As these had not been labelled as types, it seems possible that specimens found their way into other collections. One ♀ with the same label data as the lectotype, which almost certainly is a paralectotype, is in the Janse collection in TM.

### 23. *Isturgia deerraria* (Walker, 1861) comb. n.

Figs 125–128; 567, 795; 982

*Tephritis deerraria* Walker, 1861: 962. LECTOTYPE ♂, here designated, [South Africa]: Type; [indecipherable]/477; 1730; [narrow blue strip of paper cut from price list]; 30. *Tephritis deerraria*: Genitalia slide Geom[etridae] 1951–100 (BMNH) [examined]. Paralectotypes: see Remarks.

[*Aspilates occupata* Walker, 1862: 1071 (partim). Misidentification. See also under Remarks and *I. catalauaria*, above.]

*Tephritis deerraria* Walker; Wallengren, 1872: 59; Butler, 1875: 419; Swinhoe, 1904: 510; Hampson, 1909: 122; 1910: 468; Prout, 1916b: 161; 1926a: 14; 1928d: 120; 1932a: 482; 1935: 9; Janse, 1917: 112; 1932: 239.

*Tephritis nemorivaga* Wallengren, 1872: 59. Holotype ♀, [South Africa]: Caffraria interior (not traced in RMS or UZIL and probably lost) [not examined].

*Tephritis (Eubolia) deerraria* Walker; Wallengren, 1875: 121.

*Tephritis deerraria* ab. *dissocia* Warren, 1897a: 112. 'Type' ♂, here designated, [South Africa]: Type; Weenen, Natal, Jan[uary] 1894; *Tephritis deerraria* Walker ab. *dissocia* Warr. Type ♀; Geometridae genitalia slide No. 9648 (BMNH) [examined].]

[*Tephritis presbitaria* Swinhoe; Janse, 1932: 239. Incorrect synonymy.]

[?]*Tephritis disputaria* (Guenée); Aurivillius, 1910: 37. Misidentification.]

[*Tephritis deccaria* Walker; Fawcett, 1916: 728. Misspelling.]

[*Tephritis deerraria* ab. *dissocia* Warren; Janse, 1917: 112; 1932: 239 (as aberration); Fletcher, 1978a: 77 (as synonym of *deerraria*)]

*Tephritis nemorivaga* Wallengren; Janse, 1917: 112 (as good species); 1932: 239, 242 (both as synonym of *deerraria* and under species *auctorum*).

[*Tephritis pulinda* (Walker); Prout, 1932a: 483; Pinhey, 1975: 87. Misidentification.]

*Tephritis pulinda deerraria* (Walker); Agenjo, 1974: 4; Herbulot, 1978: 161; Fletcher, 1978a: 77; Wiltshire, 1952: 172; 1980: 197; 1990: 135; Hermosa, 1985: 28; Hausmann, 1991: 138.

**FORE WING LENGTH.** 11–15 mm (♂), 12–16 mm (♀).

**ADULT** (Figs 125–128). Medium-sized, with rather broad and rounded wings. Antennae of ♂ bipectinate, of ♀, ciliate. Ground colour of wings off-white, more or less heavily dusted with grey; postmedian area darker grey. Basal and median line absent or, if present, indistinct. Postmedian line usually well developed, fine, straight or at most gently curved and frequently bordered by one or several blackish marks. Discal spots

present, but not very conspicuous. Underside whitish, with dense brown-and-grey striations; markings weaker compared with upperside. Postmedian area brown, often lighter towards termen, also with darker striae. Thorax and abdomen ochreous to grey. Hind tibia of ♂ not modified. Setal comb on A3 absent. *Variation*: coloration of wings ranges from whitish-ochreous to dark grey, although most specimens are medium grey; occasionally, melanistic examples are observed.

**MALE GENITALIA** (Fig. 567). Uncus relatively narrow; gnathos as described for the group. Costa of valve slender, frequently slightly curved. Sacculus well developed, long and pointed, but not acutely so; inner margin finely serrated. Aedeagus roughly cylindrical, tapering anteriorly, and with faint apical striations. Vesica bearing one smooth, somewhat blade-like and a second, more weakly sclerotized cornutus with scobinate appearance. Octavals broadly furcate, inner margin scobinate.

**FEMALE GENITALIA** (Fig. 795). Papillae anales medium-sized. Apophyses posteriores long and slender; a. anteriores stouter, about two-thirds length of former. Sterigma not modified. Operculum with convex distal margin. Antrum short and stout. Bursa copulatrix roughly pear-shaped; ductus locally strongly sclerotized. Corpus membranous, with large signum, bearing long spicula. As in *I. exerraria*, marked intraspecific variation exists regarding shape of the bursa copulatrix and size and number of spicula of the signum.

**EARLY STAGES** (Fig. 2). Egg: length 0.52 mm, width 0.38 mm. Green, resembling *Chiasmia* eggs in shape, sculpture fairly well developed. Larva. First instar: length 2.0 mm, width 0.2 mm. Head: width 0.25 mm, light brown, ocelli darker, with two darker brown streaks running down genae. Body pale green throughout, dorsal area somewhat darker. Second instar: length 7.0 mm, width 1.0 mm. Head: width 0.7 mm, very pale brown, ocelli not darker, streaks blackish. Body: ground colour green with a reticulate pattern of undulating, incomplete brownish lines. Dorsal area light brown on T1–3 and green, turning paler caudad, on A1–10. Three pairs of blackish tubercles present on A2–4, the third pair being much smaller. Lateral area ditto, with one pair of tubercles on A3. Ventral area entirely blackish brown, including legs. Third instar: length 10 mm, width 1.0 mm. Head: width 1.2 mm, light brown, lateral streaks broken up into single spots; further dark maculae present in occipital area. Body as for L2. Fourth instar: length 25 mm, width 2.5 mm. Head: width 2.0 mm, light brown with extensive dark maculation. Body: ground colour light green. Dorsal area light brown in central two-thirds, margins much darker brown, consisting of numerous undulating brown lines. Lateral area: midlateral part pale green, with one large, dark brown

macula beneath each spiracle. Ventral area medially with two broad, dark brown lines, separated by a very fine pale green line. Outer parts lighter, but still dark brown except for area between prolegs (i.e., A6–10) which is pale green. Area between thoracic legs also paler, with only faint maculation. All legs predominantly brown. Variation: in L4 larvae, ground colour varies from yellowish-green to dark brown; the most common form is described above. Pupa: shape of cremaster as in Fig. 6b.

**DIAGNOSIS.** Very similar externally to 28. *I. arizela* and 27. *I. sublimbata*, below. Externally, the ♂ of *I. deerraria* differs from that of *I. arizela* by the usually much weaker median line on the fore wing. The differences in genitalic structure, particularly configuration of cornuti on the vesica, can be seen from the illustrations. Furthermore, *I. arizela* and *I. sublimbata* do not occur in southern Africa.

**BIOLOGY.** *Isturgia deerraria* is probably the most widespread member of the genus and occurs in a large variety of habitats, though it is certainly most abundant in savanna. The larva was reared by myself on *Acacia karroo* Hayne (= *A. natalitia* E. Meyer); this foodplant is also given by Taylor (1953). Other known foodplants include *A. hirtella* E. Meyer (Platt, 1921), further *A. nilotica* (L.) Willd. ex Delile and *Peltophorum* sp. (Caesalpinoideae) (N.J. Duke, *pers. comm.*). The species is reported as having defoliated plantations of *Acacia mollissima* in northern Africa (Rungs, 1954); the same author mentions predation by *Sturnia imberbis* Wied. (Tachinidae), several Hymenoptera (*Apanteles* sp., *Meleorus* sp., cf. *Anilastus* sp.) during periods of high larval densities. Adults are active throughout the year.

**DISTRIBUTION** (Fig. 982). Throughout Africa and absent only from the tropical forests of the western and central part of the continent. Madagascar and the Comoro Islands (Mohéli, Anjouan, Mayotte). Europe: recorded from southern Spain and Portugal; Palestine. Generally distributed in southern Africa, though scarcer in interior areas of Cape Province and Botswana.

The species was recently reported as occurring Saudi Arabia (Wiltshire, 1990) (as *pulinda deerraria*). Wiltshire figures two ♂ specimens of rather different habitus: while I have little doubt that the lower one (Fig. 106) represents *deerraria*, the upper insect (Fig. 105) may on closer examination prove to be *pulinda*, in which case the two species would occur sympatrically in that country.

**MATERIAL.** 395 ♂ (11 dissected, TM genitalia slides No. 950, 10882, 11078, 11153, 11163, 11165–66, 11168; Geometridae genitalia slide No. 10057 (BMNH); genitalia slide M. Krüger No. 2 (MZB)) and 453 ♀ (13 dissected, TM genitalia slides No. 10883, 11015, 11087,

11164, 11167, 11169, 11170, 11173–75; Geometridae genitalia slides No. 10058–60(BMNH); genitalia slide G 7502 (ZSBS)). 29 London (BMNH), 7 Paris (MNHN), 4 Vienna (NHMW), 6 Berlin (ZMHB), 13 Munich (ZSBS), 8 Florence (MZF), 632 Pretoria (TM), 16 Pretoria (SANC), 33 Cape Town (SAM), 18 Windhoek (SMWN), 31 Bulawayo (NMBZ), 14 N.J. Duke collection, 25 C. Herbule collection, 12 H.S. Staude collection.

**LOCALITIES.** **South Africa, Transvaal:** [Gauteng]: Johannesburg (4), Witkoppen/ Johannesburg (8), Pretoria (32), Silverton (1), Roodeplaat (1), Mooiplaas, Bronkhorstspruit Distr. (1). [North-West]: Rustenburg (5), Waterford (1). [Northern Province]: Derdepoort (3), Roodberg (6), Blouberg, N. side, Glenfernness (2), Ofcolaco (5), Langjan Nature Reserve (1), Wyllie's Poort (3), Selati (1), Limburg (1), Zebediela (1), Waterberg (1), Warmbad (1), Naboomspruit (2), Mosdene/Naboomspruit (9), Malta, Ptbg. (1), Pentonville, 60 m NW Vaalwater (2), Alldays, Farm Ettenmouth (4), Farm Kairo 212, NW. Alldays (1), Three Sisters (3), Sikorokoro (1), Nylsvley (7), Tzaneen (1), 12 m S. Louis Trichardt (2), Farm Rochdale 500, Zoutpansberg District (5), NE. Zoutpansberg District (1), Percy Fyfe Nature Reserve (1), Farm Deelkraal/ Nylstroom (2), Woodbush (4), Warmberg (1), Mmabolela Estate (15); Kruger National Park: Letaba Camp (12), Punda Milia (10), Olifants Camp (3), Pafuri (1), Shingwidzi (1), Satara (7), Nwanedzi (1). [Mpumalanga]: Kowyn's Pass, Pilgrim's Rest District (3), Berlin Forestry (1), Nelspruit (1), Nelspruit Nature Reserve (4), Barberton (2), Groblersdal (1), Marble Hall (1), Carolina (1), Crocodile Bridge (1); Kruger National Park: Skukuza (103), Malelane (7), Matjulwana (11). Ambiguous: Griffin Mine (3). **Free State:** Sasolburg (9), Bloemfontein (2), Golden Gate (2), Oranjekrag, H.F. Verwoerd Dam (13), Vredefort Road (4). **KwaZulu-Natal:** Jozini Dam, Lebombo Mts (5), Ndumu (6), Estcourt (1), Pietermaritzburg (4), Durban (6), Camper Down/Durban (2), Muden (3), Balgowan (1), Yellowwoods, Balgowan (1), Krantzkloof (3), Hluhluwe (1), Magude (1), Pinetown (1), Verulam (1), Nkwaleni (2), Cathkin Peak (1), Wartburg (1), New Hanover (13), Sarnia (1), Karkloof (1), Hlabeni Mist Forest, Creighton Distr. (5). **Cape Province:** [Northern Cape]: P.K. LeRoux Dam, Van der Kloof (53), Pofadder (6), 6 m W. Kenhardt, Cradock (1), Springbok (1), van Rhyn's Pass (1), Douglas (3), Brakfontein, Richtersveld (1). [Western Cape]: Saasveld (2), Mitchells Pass/Paarl (1), Klaver (1), Elsenburg (1). [Eastern Cape]: Addo (4), Lake Mentz (1), Hankey (1), Idutywa (2), Steynsburg (1), Resolution, Albany District (1), Port Elizabeth (2), Emjanyana (2), Stutterheim (1), Dohne (1), East London (5), Dunbrody (3), Umtata (7). Ambiguous: Witteklip (2), Klipplaat (4). **Swaziland:** Mpisi (4), Komati River (1). **Botswana:**

Nata (1), Maun (2), 20 km W. Maun (3), 16 km NE. Maun (1), Mosetse (1), Gaborone (7), between Palapye and Mahalapye (1), Duineveld, S. Kalahari (1), Twee Rivieren (1), Mabebe Flats (2), Tsotsorogo Pan (1). **Namibia:** Bullspoort (14), Otjiu (1), Okahandja (10), Otjivarongo (4), Waterberg (1), Gobabeb, Kuiseb River (7), Abachaus (32), Valencia Farm, Rehoboth District (16), Tsumeb (6), Grootfontein (1), Franzfontein (2), Otjitambi (1), Ong (1), Omatoko (1), Farm Djab, Rehoboth District (1), Windhoek (6), Farm Portsmut 33, Windhoek District (2), Bagani (3), Katima Mulilo, E. Caprivi (1), Kowares, S. Kaokoveld (1), Ghaub (2). **Namibia/Angola:** Ovamboland: Omafу (1), Oshikango (1), N. Ovampoland, no further data (4). **Angola:** S., Mucusso, 100 m (7), Quirimbo (3). **Moçambique:** Bela Vista (1), E. of Mt. Mlanje, 2500 ft (1), Chiluwo Hills, Vila Machado (1), 40 m SE. Inhaminga (1), Ruenya River, Shangara (1). **Malawi:** Nkopola (1), 25 km NW. Nkopola (1). **Zimbabwe:** Mutare (Umtali) District (3), Crosskopje, Umtali District (1), Mt. Selinda (1), Xmas Pass (2), Bunga Forest, Vumba (1), Kariba (3), Van Niekerk Hotel/Gwai Bridge (1), Victoria Falls (6), Fort Victoria (1), Glenlivet/Ft. Victoria (1), Harare (Salisbury) (15), Wankie (4), Umgusa Forest, Sawmills (2), Shangani (2), Umvuma (2), Bulawayo (4), Beit Bridge (1), Sebakwe (3), Darwendale (1), 17 m S. Chitrapadzi, Limpopo River (4), Bubye Bridge (2), Buhwa Foothills, Belingwe (3), Chete Game Reserve (3), Busi Farm, Chippinga (2), Popotekwe Bridge (1), Doddieburn Ranch (5). **Zambia:** 8 m N. Livingstone (2), Kitwe (2), Nangweshi (1). **Tanzania:** Tanganyika, Old Shinyanga (1), Lushoto (1), Dar-es-Salaam (3), Mpapua (1), Katesh, 5900 ft (1), Usa River, 3900 ft (2), Lake Manyara, 3150 ft (1), 50 m N. Iringa (1). **Uganda:** Mt. Elgon (1). **Madagascar:** (no further data) (1), N., Analamerana Forest, 50 km SE Diego Suarez, 80 m (3), Diego Suarez (3), S., Lac Tsimanampetsotsa (1). **Comoro Islands:** Mohéli, Fomboni, 10 m (3), Anjouan, Mutsamudu, 50 m (1), Mayotte, Kavani-M'sapré, 15–25 m (1). **Zaire:** (Belgian Congo), Elisabethville (3). **Nigeria:** Kaduna (4), N., Azare (1), N., Zungero (1), N., Zaria, Samaru (1). **Togo:** Sokodé (1). **Cabo Verde:** S. Vincente, Rib. Juliao (1), S. Antao gr. Porto Novo (1). **Ghana:** N. Territory, Navaro (1). **Senegal:** Cap d'Kirmig (1), Thies (3), Selikotane (3), near Dakar (1), Oussayaye (1), Sédihiou (2). **Gambia:** no further data (2). **Morocco:** Ht. Atlas, Barrage Cavagnac (2), Ht. Atlas, Tilleriot (1), Rabat (4), env. Taourirt (1), Prov. Oran, Perrégaux (1), Tanger, 150 ft (2), Mogador (1). **Algeria:** La Redoute/ Algier (5). **Spain:** Cadiz (4). **Portugal:** Manchique (1). **Arabia:** Hodieda (1). **Yemen:** Aden (2). **Red Sea:** Port Sudan (1). **Somalia:** Afgoi (8). Not traced or ambiguous: Matlala (1), Kolomo (1).

**REMARKS.** (i) The description of *T. deerraria* Walker is based on four syntypes (a. Cape, b-d. South Africa).

One ♂ specimen labelled as type has been selected as lectotype (see above). The remaining three 'paralectotypes' (two males, one female) are, in fact, *exerraria* (Geometridae genitalia slides No. 9644 ♂, 9645 ♀) (BMNH). They bear the circular labels, 'S.Africa/44.6' (♂, ♀) and 'C.G. Hope/44.6' (♂).

(ii) In the recent literature, *I. deerraria* was mostly treated as a subspecies of *I. pulinda* (Walker, 1860) from India, with *Macaria strenuataria* Walker, (1863) 1862, *M. integrata* Walker, (1863) 1862, and *M. boaria* Swinhoe, 1885 being variously given as synonyms. Examination of the types of these taxa has shown that, although they are closely related, none is conspecific with the African *deerraria*. *I. deerraria* has only relatively recently been recorded from Europe (Agenjo, 1974); it was not listed by Schmidlin (1964).

(iii) While the lectotype of *Aspilates occupata* is conspecific with *I. catalaunaria*, Janse (1932: 238, 239) indicates that the type series was mixed and contained specimens of *I. deerraria* as well.

#### 24. *Isturgia pygmaeata* sp. n.

Figs 129, 130; 568, 796

TYPE MATERIAL. Holotype ♂, [Tanzania]: (Deutsch Ost Afrika), Gomba, B.L.J. Amani; genitalia slide M. Krüger No. 1 (ZMHB). Paratype (1 ♀). [Tanzania]: same data as holotype; genitalia slide M. Krüger No. 2 (ZMHB).

FORE WING LENGTH. 10 mm (♂), 11 mm (♀).

ADULT (Figs 129, 130). Very small. Wings slightly glossy; ground colour cream white with dense greyish brown striation; postmedian area largely suffused with greyish brown. Basal line faint and entirely absent on hind wing; median rather well developed, more like a fascia; postmedian complete but very fine. Discal spots large on fore wing, inconspicuous on hind wing. Underside very similar. Vestiture of thorax and abdomen ochreous-grey. Hind tibia of ♂ not modified. Seta comb on A3 absent.

MALE GENITALIA (Fig. 568). Uncus and gnathos as described for the group. Costa of valve long and narrow, not curved or dilated apically. Sacculus rounded, with outer margin finely serrated. Aedeagus long and slender; vesica with apical striations; arrangement of cornuti as in figure. Octavals not very large, acutely pointed and with scobinate inner margin.

FEMALE GENITALIA (Fig. 796). Papillae anales of normal size. Both pairs of apophyses delicate; a. anteriores hardly shorter than a. posteriores. Sterigma: l. antevaginalis broadly crescentic. Bursa copulatrix pear-shaped; signum medium-sized.

DIAGNOSIS. Very similar to 29. *I. quadriplaga* f. *pallidaria*, below, though perhaps slightly darker. The

differences in the male genitalia are evident from the illustrations (compare Figs 568 & 573).

DISTRIBUTION. Gomba region of Tanzania.

ETYMOLOGY. From Latin *pygmaeus* (-i), a pygmy; the name refers to the small size of the moth.

#### 25. *Isturgia griveaudi* sp. n.

Figs 131; 569, 797

TYPE MATERIAL. Holotype ♂, Madagascar: Sud, Rés[erve] nat[urelle] int[égrale] 10, lac Tsimanampetsotsa, 7/10-II-1969, (P. Viette et P. Griveaud); genitalia slide M. Krüger No. 10 (MNHN). Paratypes (1 ♂, 3 ♀). Madagascar: 1 ♀, same data as holotype; genitalia slide M. Krüger No. 11 (MNHN); 1 ♂, Sud, plateau Mahafaly, 11/12 km Ouest d'Ankalirano, 250 m, 1/6-II-1974 (P. Viette et A. Peyrieras); 1 ♀, Sud, envir[ons] de Tuléar, plat[eau] calc[aire] au S.E. de Miary, 40 m, 23/27-I-1969 (P. Viette et P. Griveaud); 1 ♀, Sud, 14 km S. de Beloha, piste de Lavanona, 3/5-III-1968 (P. Griveaud) (MNHN).

FORE WING LENGTH. 11–12 mm (♂), 12–13 mm (♀).

ADULT (Fig. 131). Small; general appearance brownish rather than grey. Ground colour of wings cream, irregularly suffused and striated with greyish brown; striation much heavier in males. Postmedian area markedly darker in all specimens examined except in holotype. Lines variously developed and ranging from almost prominent to largely reduced, apparently independent of sex of specimen. Discal spots conspicuous, larger and circular on fore wing. Underside similar, but ground colour more whitish and suffusion darker, thus light and dark areas more contrasting. Vestiture of thorax and abdomen greyish ochre, mixed with dark scales. Hind tibia lost in both ♂ specimens. Seta comb on A3 absent.

MALE GENITALIA (Fig. 569). Uncus and gnathos as described for the group. Costa of valve elongated, slender and practically straight. Sacculus triangular, rounded; ventral margin serrated. Saccus forming a short, broad tip. Aedeagus gently tapering towards apex, with two median cornuti typical of the group (one smooth, one scobinate) and some faint striation below apex. Octavals w-shaped, tips acute, pointing outwards, inner margin scobinate.

FEMALE GENITALIA (Fig. 797). Papillae anales normal. Apophyses relatively stout, a. anteriores about two-thirds length of a. posteriores. Sterigma: l. antevaginalis broadly crescentic; l. postvaginalis not modified. Operculum and antrum well developed. Bursa copulatrix pyriform, somewhat elongated. Signum large.

**DIAGNOSIS.** The moth resembles dark adults of 29. *I. quadriplaga*, but is slightly larger, with broader wings. Distributional data are important, since *I. griveaudi* is limited in its distribution to southern Madagascar, while *quadriplaga* occurs widely throughout northern and eastern Africa.

**BIOLOGY.** Apparently confined to the arid parts of southern Madagascar where it has been found at altitudes from 40–250 m. Adults have been collected from January to March.

**DISTRIBUTION.** Southern Madagascar.

**ETYMOLOGY.** Named in honour of P. Griveaud in recognition of his contribution to the knowledge of the Madagascan lepidopterous fauna.

## 26. *Isturgia pervaria* (Lederer, 1855) comb. n.

Figs 132, 133; 570, 798

*Eubolia pervaria* Lederer, 1855: 213. Holotype ♂, [Lebanon]: Beirut (not located in NHMW) [not examined]. This *Isturgia* is strikingly marked and its identity can be established from Lederer's description.

*Fidonia albofascia* Swinhoe, 1884: 527. Holotype ♂, [India]: 1364 ♂, Kurrachee, 9.[18]79; *Fidonia albofasciata* [sic] C. Swinhoe (BMNH) [examined].

### Syn. n.

*Tephritis pervaria* (Lederer); Hampson, 1895: 210; Wiltshire, 1980: 197; 1990: 135; Hausmann, 1991: 138.

*Eubolia pervaria* Lederer; Staudinger & Rebel, 1901: 354.

**FORE WING LENGTH.** 9–10 mm (♂), 10–11 mm (♀).

**ADULT** (Figs 132, 133). Small and dark, particularly the ♂. ♂: ground colour of wings cream-white, densely suffused with dark grey-brown, leaving only a narrow fascia of ground colour proximal of postmedian line. Median line indistinct, ill defined; postmedian clear, fine. Discal spots faint. Underside similar, somewhat paler. ♀: ground colour whitish, thickly dusted with grey in basal and median area, postmedian area wholly medium grey. Discal spots larger on fore wing. Basal and median lines faint, incomplete, their position marked by some blackish marks on dorsum of fore wing. Postmedian line rather more complete but also inconspicuous, by yellow on fore wing. Underside whitish with orange-brown striae in basal and median area; discal spots well developed; postmedian area entirely orange-brown with some pale blotches along termen. Vestiture of thorax and abdomen concolorous with wings, darker in ♂. Hind tibia of ♂ not modified. Setal comb on A3 present.

**MALE GENITALIA** (Fig. 570). Uncus and gnathos as described for the group. Costa of valve relatively short and curved, tapering towards apex. Sacculus triangular. Aedeagus long and cylindrical, apical third striated. Vesica apparently with scobinate cornutus only. Octavals broadly furcate, inner margin scobinate.

**FEMALE GENITALIA** (Fig. 798). Papillae anales normal. Both pairs of apophyses rather strong, a. anteriores reaching about two-thirds length of a. posteriores. Lamella antevaginalis weakly sclerotized, irregularly crescentic. Posterior margin of operculum evenly rounded. Antrum short; corpus pear-shaped, ribbed posteriorly, otherwise membranous. Signum small, circular, with short spicula.

**DIAGNOSIS.** The ♂ is easily recognized on account of its small size and dark grey-brown suffusion; the ♀, however, greatly resembles small examples of other species of this group and dissection of the genitalia is necessary for reliable identification. In general shape of the bursa, the genitalia of *I. pervaria* resemble those of *I. sublimata* and *I. pygmaeata* but may be recognized by the rounded margin of the operculum and the small signum, which has very short spicula.

**BIOLOGY.** In Saudi Arabia, adults have been collected in September and May; the larva was found on *Acacia* and *Prosopis* (Wiltshire, 1990).

**DISTRIBUTION.** From the Middle East (Israel, Lebanon) through Arabia (Saudi Arabia, Bahrain) to southern India (Karachi and Hyderabad).

**MATERIAL.** 7♂ (1 dissected, Geometridae genitalia slide No. 16161) (BMNH) and 3♀ (1 dissected, Geometridae genitalia slide No. 16162) (BMNH). 6 London (BMNH), 4 Vienna (NHMW).

**LOCALITIES.** **Bahrain:** Zallaq (5). **Saudi Arabia:** Riyadh (1). **[Israel]:** (Syria), Haifa (4).

## 27. *Isturgia sublimata* (Butler, 1884) comb. n.

Figs 134, 135; 571, 799

*Tephritis sublimata* Butler, 1884: 502. LECTOTYPE

♀, here designated, [Yemen]: Aden, 84.43 (35)/  
*Tephritis sublimata* Butler type; Genitalia slide  
Geom[etridae] 1951–197 (BMNH) [examined].

*Tephritis sublimata* Butler; Wiltshire, 1949: 426; 1980:  
197; 1990: 135.

**FORE WING LENGTH.** 12–14 mm (♂), 12–13 mm (♀).

**ADULT** (Figs 134, 135). Ground colour of wings whitish, thickly dusted and striated with grey. Basal and median lines indistinct and partly reduced, but their position marked by blackish marks on dorsum of fore wing. Postmedian line better developed, but also faint on hind wing. Discal spots grey, inconspicuous, larger

on fore wing. Underside: cream white, variously striated with pale greyish-brown in basal and median area; discal spots clear. Postmedian area coffee-brown, with paler blotches along termen. Thorax and abdomen ochreous with fine grey dusting. Hind tibia of ♂ dilated, bearing hair-pencil. Setal comb on A3 present.

**MALE GENITALIA** (Fig. 571). Uncus dome-shaped, appearing slightly swollen; gnathos slender, rather rounded. Costa of valve fairly massive, curved and clearly dilated apically; sacculus triangular. Saccus extended to form a long tip. Aedeagus elongated, cylindrical; vesica with a broad and massive median and a long, needle-like apical cornutus. Octavals furate, with broadly rounded tips.

**FEMALE GENITALIA** (Fig. 799). Papillae anales of medium size. Apophyses slender; a. anteriores about two-thirds length of a. posteriores. Posterior margin of operculum very weakly emarginate. Antrum short and massive. Ductus short, heavily sclerotized and ribbed; corpus rounded, membranous; signum very large, with long spicula.

**DIAGNOSIS.** Difficult to separate externally from 23. *I. deerraria*. Although specimens of *I. sublimbata* are frequently more ochreous and have a rather mottled appearance, dissection of the genitalia is necessary for reliable identification. In the ♂, the configuration of cornuti on the vesica and the blunt tips of the octavals are typical for *sublimbata*; in the ♀, the massive antrum, together with the very large signum, should enable identification.

**BIOLOGY.** In Saudi Arabia, the larva feeds on species of *Acacia* (Wiltshire, 1990). Adults have been collected in June–July, August and December in Ethiopia, and from January to March in Arabia. Label data suggest that the species is at least partly diurnal (cf. *I. disputaria*).

**DISTRIBUTION.** Described by Wiltshire (1990) as saharo-sindian; recorded from the Middle East (Israel), Arabia (Saudi Arabia, Yemen) and East Africa (Ethiopia and Tanzania).

**MATERIAL.** 12♂ (1 dissected, Geometridae genitalia slide No. 16163) (BMNH) and 16♀ (1 dissected, Geometridae genitalia slide No. 16164) (BMNH). 23 London (BMNH), 2 Munich (ZSBS), 3 Vienna (NHMW).

**LOCALITIES.** **Tanzania:** (Deutsch Ost Afrika), Madibira (2). **[Ethiopia]:** (Abyssinia), Dire Daoua (14). **Saudi Arabia:** Taif (1), SW Najd, Bisha, Mithab (1), Jidda (2), Mecca (1), Wadi Shaqa (1), Wadi Hama (1), Wadi Yamaniya (1), Arabia (no further data) (1). **Yemen:** Aden (2). **Israel:** En Gedi (1).

## 28. *Isturgia arizela* (Fletcher, 1978) comb. n.

Figs 136, 137; 572, 800

***Tephritis arizela*** Fletcher, 1978a: 77. Holotype ♂, [Kenya]: Brit[ish] E[ast] Africa, S[outh] Kavirondo, Kuja Valley, 4000 ft., 1.V.1911, S.A. Neave 1912–92; specimen photographed; Geometridae genitalia slide No. 9646; *Tephritis arizela* Fletcher Holotype ♂ (BMNH) [examined]. Paratypes (3♂, 1♀). [Kenya]: 1♀, same data as holotype; Geometridae genitalia slide No. 9647 (BMNH) [examined]; 3♂, **Tanzania:** Usa River, 3900 ft, 30.IV.–3.V.1965 (Dr J. Szunyoghy) (TMB) [not examined].

**FORE WING LENGTH.** 14–15 mm (♂), 14 mm (♀).

**ADULT** (Figs 136, 137). Ground colour of wings whitish, densely irrorated with dark brown, especially in postmedian area. All three lines well developed on fore wing, blackish; median particularly prominent. Basal line absent on hind wing, otherwise similar. Discal spot large and conspicuous on fore wing, smaller on hind wing. Underside with markings very similar to upperside, median line slightly less heavy, but still prominent. Coloration more orange brown. Vestiture of thorax and abdomen light grey, with light brown irroration. Hind tibia of ♂ not modified. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 572). Uncus and gnathos as described for the group. Costa of valve moderately robust, straight or gently recurved. Sacculus short, well rounded, its outer margin with minute serrations. Saccus massive, forming broadly rounded tip. Aedeagus large, straight, widening apically; vesica bearing one long, needle-like, and a second, broader cornutus. Octavals with tips conspicuously directed outwards; inner margin bearing a fringe of stout hairs.

**FEMALE GENITALIA** (Fig. 800). Papillae anales well developed, pointed. Both pairs of apophyses strong, a. anteriores about two-thirds length of a. posteriores. Operculum small, semicircular. Antrum normal for the group. Bursa copulatrix roughly pear-shaped, its entire wall evenly ribbed. Signum large, with long spicula.

**DIAGNOSIS.** Externally perhaps closest to 33. *I. arizeloides*, below, but distinguished by the even heavier, continuous median line on both wings. In the male genitalia, the scobinate octavals, long and rounded saccus and the well developed lateral lobes at the base of the uncus are characteristic for *I. arizela*.

**BIOLOGY.** The species inhabits savanna. Adults have been collected in April–May and December at elevations around 1300 m (4000 ft.).

**DISTRIBUTION.** East Africa, recorded from Kenya and Tanzania.

**MATERIAL.** 1♂ (dissected, genitalia slide No. 6733) (ZSBS). 1 Munich (ZSBS).

LOCALITIES. [Tanzania]: (Tansania), Ngorongoro (1).

**29. *Isturgia quadriplaga* (Rothschild, 1921)**  
comb. n.

Figs 138, 139; 573, 801

*Tephrina quadriplaga* Rothschild, 1921: 217. Holotype ♂, [Nigeria]: Takougout, Damergou, 26. March [19]20 (A. Buchanan); *Tephrina quadriplaga* Rothschild. Type; Geometridae genitalia slide No. 9649 (BMNH) [examined]. Paratype (1♂). [Nigeria]: ibidem, dated 13.III.1920; Genitalia slide Geom[etridae] 1951–209 (BMNH) [examined].

*Tephrina disputaria pallidaria* Le Cerf, 1924: 209. LECTOTYPE ♂, here designated, [Ethiopia]: Type; Erythrée, Mersa Fatma, 10–15.i.1922 (H. Ungemach), Muséum Paris; *T. disputaria* Guenée s.sp. *pallidaria* Le Cerf ♂ Type, F. Le Cerf det.; *Tephrina disputaria* Guen., L.B. Prout det.; = *quadriplaga* Rothschild, 1921, African representative of *putinda* Wlk. [handwritten]; *Tephrina disputaria* Gn. sub. *pallidaria* Le Cerf. Ann. Soc. ent. France 1924, 93, p. 209 (P. Vienne Août 1952); genitalia slide M. Krüger No. 6 (MNHN) [examined]. Paralectotype (1♀). [Ethiopia]: same data as lectotype, bearing additional label, 'Allotype' (MNHN) [examined].

*Tephrina pallidaria* Le Cerf; Prout, 1931: 272.

*Tephrina quadriplaga* Rothschild; Fletcher, 1978a: 76; Wiltshire, 1980: 136; 1990: 136.

*Tephrina disputaria pallidaria* Le Cerf; Fletcher, 1978a: 76 (synonymy).

FORE WING LENGTH. 10 mm (♂), 11–12 mm (♀).

ADULT (Figs 138, 139). Very small to small, particularly the ♂. Apex of fore wings pointed. Wings faintly glossy, cream-white and irregularly striated with brown, more heavily so on fore wings. Postmedian area wholly brown, lighter towards termen. All three lines well developed on fore wing, in particular median line bold. Basal line absent on hind wing. Discal spots blackish on fore wing, encompassed by median line, minute on hind wing. Underside cream-white, with brown striation of varying intensity; discal spots and median line present. Postmedian area light brown with a series of cream-white blotches along termen. Vestiture of thorax and body ochreous to ochreous brown, mixed with grey scales. Hind tibia of ♂ not modified. Seta comb on A3 absent. Variation. Extent of dark scaling on wings variable. Very pale specimens, which do not seem to be confined to a particular part of the species' geographic range, are referable to f. *pallidaria* (Le Cerf).

MALE GENITALIA (Fig. 573). Uncus and gnathos as described for the group. Valve slender; costa narrow,

gently curved, not dilated apically. Sacculus triangular with rounded apex; termen serrated. Saccus terminating in very broad tip. Aedeagus widening towards apex; vesica with one smooth and one scobinate cornutus. Octavals furcate, acutely pointed, inner margin finely serrated.

FEMALE GENITALIA (Fig. 801). Papillae anales very narrow. Both pairs of apophyses slender and of about equal length. Sterigma not modified. Posterior margin of operculum clearly emarginate. Bursa copulatrix elongated; antrum and posteriormost part of ductus sclerotized, remainder membranous, delicate. Signum medium-sized, circular.

DIAGNOSIS. The small size is characteristic. In habitat, *I. quadriplaga* is rather like *I. pygmaeata*. Males are best separated by comparing the aedeagi (striated in *pygmaeata*, smooth in *quadriplaga*). In the female, the bursa copulatrix of *quadriplaga* is much more elongated.

BIOLOGY. Associated with arid savanna and desert-like habitats. Adults have been collected in January, from March to June and in November.

DISTRIBUTION. Northern and eastern Africa, recorded from Somalia, Djibouti, northern Nigeria, Ethiopia, Kenya and Tanzania. On the Arabian Peninsula in Saudi Arabia and Yemen.

MATERIAL. 38♂ (3 dissected, genitalia slide No. 11245 (TM); Geometridae genitalia slide No. 16157 (BMNH); M. Krüger genitalia slide No. 1 (MZB)) and 34♀ (1 dissected, Geometridae genitalia slide No. 16158 (BMNH). 49 London (BMNH), 6 Pretoria (TM), 3 C. Herbulot collection, 14 Florence (MZB).

LOCALITIES. [Somalia]: (Somaliland), 10°10'N 45°45'E, 1500 ft (1), 9°30'N 44°30'E, 4000 ft (1), Buran, 3000 ft, 10°13'N 48°47'E (1), Red Sea, Port Sudan (3), Hargeisa (2), Afgoi (14). [Ethiopia]: (Abyssinia), Dire Daoua (14), Gardoba-Djira, Garre (1), Woreda, Ganale River (2), Adis Abeba (1), Gorobube, Upper Web. River (1), Karo-Lola, S. of Dana River (1), Solole, Ganale River (1). [Kenya]: Mutha (2), Luitpold Mts., W. side nr. Ikutha (1), Makindu, S. of Nairobi (1), Kibwezi (8), Uaso Nyiro, 2200 ft (1). [Djibouti]: Terr. Fr. des Afars et d'Isas, Djibouti, Route de Mabla (1). [Tanzania]: Lake Sereri, 3150 ft (1); Usa River, 3900 ft (1), Largido (1), Katesh, 5900 ft (1), 50 m S. Dodoma (6), Manda Island (1). [Yemen]: Sheik Othman near Aden (2). [Saudi Arabia]: (Arabia), Jidda (1). Not traced: Duraimia (2).

**30. *Isturgia inaequivirgaria* (Mabille, 1890)**  
comb. n.

Figs 140; 802

*Tephrina inaequivirgaria* Mabille, 1890: 49. Lectotype

♀, Senegal: En mer- Côtes du Senegal 14.vii.; Ex musaeo P. Mabille 1923; Ex Oberthür Coll. B.M.1927-3; *Tephrina inaequivirgaria* Mab.; *Tephrina inaequivirgaria* Mabille Lectotype ♀ sel. D.S. Fletcher 1966; Geometridae genitalia slide No. 9643 (BMNH) [examined]. Paralectotype (1 ♀). **Senegal:** *ibidem* (BMNH) [examined].

*Tephrina inaequivirgaria* Mabille; Janse, 1932: 242 (under species auctorum).

FORE WING LENGTH. 14 mm (♀ lectotype).

ADULT ♀ (Fig. 140). Wings elongated. Ground colour cream, striated with coffee brown. Postmedian area suffused with ochreous grey and with additional coffee brown striations. Basal and median lines largely reduced. Postmedian also weak but bordered in parts by blackish brown and thus more conspicuous. Discal spots large on fore wing, slightly smaller on hind wing. Underside whitish with sparse light brown striation. Postmedian area nearly entirely light brown save for small lighter blotches. Discal spots clearly discernible, other markings absent. Body ochreous grey.

FEMALE GENITALIA (Fig. 802). Papillae anales pointed. Apophyses well developed, a. anteriores two-thirds length of a. posteriores. Operculum wide, with evenly rounded posterior margin. Antrum long, well sclerotized. Bursa copulatrix membranous except for discrete sclerotized areas near antrum. Corpus bursae somewhat elongated, pear-shaped. Signum prominent.

DIAGNOSIS. Similar to 23. *I. deerraria* (Walker), but apparently distinguished by the more elongated wings. The reliability of this character can only be tested once more material becomes available. The differences in ♀ genitalic structure are apparent (compare Figs 795 and 802).

BIOLOGY. The two adults examined were collected near the coast in July.

DISTRIBUTION. Coastal areas of Senegal.

MATERIAL. Known from the types only.

## 5. *Isturgia presbitaria*-group

The eight species included in this group are the most derived members of the genus *Isturgia* in the Afrotropical region (see Phylogeny). Synapomorphies include the mitre-shaped uncus in the male genitalia and the extreme development of the ductus bursae in the female, giving the bursa copulatrix a pipe-shaped appearance. The group is widely distributed in southern and eastern Africa, but is absent from Madagascar.

MALE GENITALIA (Figs 574-580). Uncus mitre-shaped. Gnathos angular. Costa of valve slender

and not or only weakly dilated apically, straight or somewhat curved. Sacculus triangular, mostly evenly rounded. Saccus drawn into an occasionally long tip. Aedeagus exhibiting some variation in length and shape, as well as in armament of the vesica. In some species the vesica carries a prominent apical serration. Octavals strongly developed and mostly deeply excised; tips and inner margin scobinate.

FEMALE GENITALIA (Fig. 803-810). Papillae anales and both pairs of apophyses without particular modifications. Sterigma with lamella antevaginalis forming a broadly crescentic or shield-shaped plate; lamella postvaginalis not modified. Operculum present, cone-shaped. Antrum relatively short and massive. Ductus bursae (except in *I. spissata*) greatly elongated and heavily sclerotized. Corpus bursae membranous, small and rounded. Signum large, with long spicula. bis hier

## Key to species

- 1 Adult (Figs 144-146) with mostly well developed, blackish lines on fore wing. ♂ genitalia (Fig. 575) with rather acutely pointed sacculus and shallow octavals. ♀ genitalia (Fig. 804) with short bursa; ductus bursae not strongly developed. Mostly southern Africa .....  
..... 32. *spissata* (Walker), p. 105
- Adults (Figs 141-143, 147-157) mostly with less well developed lines on fore wing. ♂ genitalia, where known (Figs 574, 576-580), with tip of sacculus rounded and octavals more deeply excised. ♀ genitalia with strongly elongated ductus bursae (e.g., Fig. 807). Throughout study area ..... 2
- 2(1) Very pale grey moths with faint markings (Figs 141-143). ♂ genitalia (Fig. 574) with uncus not typically mitre-shaped, but rather appearing swollen. ♀ genitalia (Fig. 803) with wall of ductus bursae smooth and a circular, near-hyaline area in centre. Endemic to Saudi Arabia .....  
..... 31. *philbyi* (Wiltshire), p. 105
- Darker, whitish, ochreous or grey species with more strongly developed markings (Figs 147-157). ♂ genitalia with uncus typically mitre-shaped. ♀ genitalia with wall of ductus bursae ribbed, without hyaline central area. Absent from Saudi Arabia ..... 3
- 3(2) Relatively small species (fw length 11-13 mm) (Figs 152, 153). ♂ genitalia (Fig. 578) with strongly elongated saccus; aedeagus slender and curved. ♀ genitalia (Fig. 807) with narrow ductus and very small corpus bursae; signum small. Kenya and Tanzania ..... 35. *megasaccus* sp. n., p. 108
- Larger species (fw length 12-16 mm). ♂ genitalia (e.g., Fig. 576) with saccus much shorter; aedeagus

- stouter, largely cylindrical. ♀ genitalia with broad ductus and somewhat larger corpus bursae; signum large. Widely distributed, including Kenya and Tanzania ..... 4
- 4(3) ♂ abdomen with very long octavals (e.g., Fig. 577); ♂ genitalia as illustrated, not as below. ♀ genitalia with narrowly elliptical operculum (Figs 806, 808–810). Eastern Africa ..... 5
- ♂ abdomen with markedly shorter octavals (Fig. 576); ♂ genitalia with dorsally serrated aedeagus bearing one sword-like and one rod-like cornutus. ♀ genitalia with broadly triangular operculum (Fig. 805). Southern Africa ..... 33. *arizeloides* sp. n., p. 107
- 5(4) Whitish-grey moths (Figs 150, 151). ♂ genitalia (Fig. 577) with aedeagus bearing an apical, blade-like cornutus. ♀ genitalia (Fig. 806) with ductus bursae relatively short and small, semicircular l. postvaginalis. Kenya and Tanzania ..... 34. *albogrisea* sp. n., p. 108
- Moths not whitish-grey (Figs 154–157). ♂ genitalia, where known, with aedeagus lacking blade-like cornutus (Figs 579, 580). ♀ genitalia (Figs 808–810) with longer ductus bursae and differently shaped l. postvaginalis (except for *I. presbitaria*, where shape of l. postvaginalis unknown). Distribution may overlap ..... 6
- 6(5) Adult as in Fig. 157. ♀ genitalia (Fig. 810) with l. postvaginalis square, and with concave distal margin and operculum as illustrated. ♂ unknown. Tanzania ..... 38. *kiellandi* sp. n., p. 110
- Adult as in Figs 154–156. ♂ genitalia as in Figs 579, 580. ♀ genitalia (Figs 808, 809) with l. postvaginalis and operculum not as above. Rwanda; East Africa ..... 7
- 7(6) Moths greenish (Fig. 156). ♂ genitalia (Fig. 580) with typically mitre-shaped uncus; configuration of cornuti as illustrated. ♀ genitalia with operculum as in Fig. 809. Rwanda ..... 37. *virescens* sp. n., p. 110
- Moths ochreous, with variable markings (Figs 154, 155). ♂ genitalia (Fig. 579) with uncus tectiform rather than mitre-shaped; configuration of cornuti as illustrated. ♀ genitalia with operculum as in Fig. 808. Eastern Africa ..... 36. *presbitaria* (Swinhoe), p. 110

### 31. *Isturgia philbyi* (Wiltshire, 1980) comb. n.

Figs 141–143; 574, 803

*Tephrina philbyi* Wiltshire, 1980: 197. Holotype ♂, [Saudi Arabia]: Arabia; Mahidh, 21.XI.1936 (H.St. J.B. Philby) B.M. 1937–228/6951; Geometridae genitalia slide No. 9660; *Tephrina philbyi* Wiltshire Holotype ♂ (BMNH) [examined]. Paratypes (2♂, 6♀). [Saudi Arabia]: same data as holotype. 3 dissected (Geometridae genitalia slides No. 9661, 9664, 9665 (BMNH)) [examined].

*Tephrina philbyi* Wiltshire; Wiltshire, 1990: 135.

FORE WING LENGTH. 12 mm (both sexes).

ADULT (Figs 141–143). Ground colour of wings whitish, densely irrorated with pale grey; postmedian area more or less completely suffused with grey. Lines greatly reduced: basal practically absent; median present as an indistinct fascia; postmedian complete, but very fine. Discal spots well developed on fore wing; small and inconspicuous on hind wing. Underside: similar to upperside, grey dusting less dense. Vestiture of thorax and body slightly darker grey than wings. Hind tibia of ♂ simple. Setal comb on A3 absent.

MALE GENITALIA (Fig. 574). Uncus prominent, appearing swollen; gnathos as described for the group. Costa of valve practically straight. Sacculus triangular. Aedeagus cylindrical, vesica bearing two large apical cornuti and a rather weak subapical serration. Octavals furcate, with scobinate tips.

FEMALE GENITALIA (Fig. 803). Papillae anales large. Apophyses moderately stout, a. anteriores approximately the same length as a. posteriores. Sterigma (l. antevaginalis) very faint, broadly crescent-shaped. Operculum cone-shaped, rather large. Antrum weakly sclerotized. Bursa copulatrix with strongly developed and sclerotized ductus, accounting for more than half total length. Corpus rounded with membranous wall; signum large.

DIAGNOSIS. In facies similar to 33. *I. arizeloides*, below, and best separated from that species by the arrangement of the cornuti on the vesica: in *I. philbyi*, two short and massive apical cornuti plus a moderately strong serration are present, while in *I. arizeloides* three cornuti (two apical, one median) are developed; all of these are slender. In the female genitalia, the ductus bursae is very long and the signum large. *I. philbyi* is so far only known from southwest Arabia, so that distributional data are important. Other similar species include 37. *presbitaria* and 28. *subliubata*, but *I. philbyi* is more robust, with more pointed fore wings which nearly always seem to lack the dark maculation along the postmedian line.

BIOLOGY. A semidesert species. Adults have been collected in January and November.

DISTRIBUTION. Endemic to Saudi Arabia.

MATERIAL. Only the types were seen.

### 32. *Isturgia spissata* (Walker, 1862) comb. n.

Figs 144–146; 575, 804; 983

*Aspilates spissata* Walker, 1862: 1071. Holotype ♀, South Africa: Type; S.Africa/44 6; 14. *Aspilates*

*spissata*; 207; Genitalia slide Geom[etridae] 1951–203 (BMNH) [examined].

‡*Tephritis strigulifera* Prout. ‘Holotype’ ♂, [South Africa, KwaZulu-Natal]: (J.M. Hutchinson) Estcourt, Natal 1894–[19]05; *Tephritis strigulifera* Prout ♂ type; G[enitalia slide] 2717; This proved to be the same as *spissata* and description is therefore [sic] suppressed [in Prout’s hand]; *Tephritis strigulifera* Prout ♂ Holotype No. 5946 (TM) [examined]. **Manuscript name.**

*Tephritis spissata* (Walker); Janse, 1917: 112; 1932: 240.

FORE WING LENGTH. 14–15 mm (♂), 14–16 mm (♀).

ADULT (Figs 144–146). Variable, but rather large, with broad wings. Antennae bipectinate in ♂, shortly ciliate in ♀. Ground colour pale ochreous, suffused with ochreous, greyish brown or grey, and lightly to heavily dusted with grey. Postmedian area of both wings darker. All three lines usually present on fore wing, at least near dorsum, and heavily marked with black; postmedian complete, more or less straight and reaching costa, other lines frequently not developed beyond discal spot. Hind wing regularly only with postmedian line present, occasionally a weak and ill-defined median also developed. Discal spots faint or absent on fore wing, absent on hind wing. Underside whitish with dense grey-brown dusting; markings largely reduced. Postmedian area wholly light brown-and-grey, with some paler blotches along termen. Vestiture of thorax and body ochreous to ochreous-grey, with grey dusting of varying intensity. Hind tibia of ♂ not modified. Setal comb on A3 absent. Variation: the heaviness of black marking of the basal and median line on the fore wings is subject to considerable variation. The species also exhibits a tendency to melanism, although entirely black examples have not been recorded.

MALE GENITALIA (Fig. 575). Uncus comparatively short and compact; gnathos as described for the group. Costa of valve slender, slightly recurved and weakly dilated apically. Sacculus pointed, without particular sclerotizations. Aedeagus long and roughly cylindrical, but pointed apically; vesica with a single, moderately large, scobinate median cornutus present. Octavals broadly arcuate, shallow.

FEMALE GENITALIA (Fig. 804). Papillae anales large. Apophyses anteriores markedly stouter than a. posteriores and over two-thirds length of latter. Sterigma broad, crescentic. Operculum cone-shaped; antrum inconspicuous. Bursa copulatrix small, with ductus bursae gradually widening into corpus. Signum very large, circular, with long spicula.

EARLY STAGES (Fig. 6c). Egg: length 0.55 mm, width 0.4 mm, green. Structure as in *Chiasmia* but stouter. Eggs darken soon and take on a dark bronzy shade.

Aeropyles prominent. Larva. First instar: length 1.25 mm, width 0.2 mm. Head: width 0.3 mm, light brown, ocelli darker, with dark dorsal streak of body continuing down genae. Body: ground colour whitish green, but most of body area covered with blackish markings. Dorsal area nearly wholly blackish except for claspers and a squarish area in middorsal position on T1. Area around bases of setae whitish green. Lateral area of ground colour, but not sharply demarcated against dorsal and ventral areas. Ventral area whitish green on T1–3 and blackish, becoming gradually lighter, on A1–10. Thoracic legs and prolegs on A10 of ground colour; prolegs on A6 blackish. Second instar: length 4.5 mm, width 0.4 mm. Head: width 0.45 mm, pale greenish white. Two broad, dark brown streaks running down genae, encompassing ocelli. Body: dorsal area nearly wholly blackish brown, only T1–2 lighter brown. Lateral area with indistinct, pale greenish central line, otherwise dark brown mottled with pale green. Ventral side virtually wholly blackish brown, with faint and incomplete paler lines. Thoracic legs and prolegs on A6 dark brown, prolegs on A10 lighter. Third instar: length 15 mm, width 1.5 mm. Head: width 1.3 mm, medium brown with extensive dark brown maculation. Body: ground colour olive to cream. Dorsal area of ground colour, with intricate pattern of at least 6 undulating, incomplete brown lines; 1 central black spot directly posterior of intersegmental membrane per segment. Lateral area paler, with broad, still lighter central line; line pattern as on dorsal area. Ventral area light brown with a central broad streak, bordered on each side by four darker brown lines, but pale green between A6 and A10. All legs brown. Fourth instar: length 18 mm, width 2 mm. Head: width 2 mm, yellowish brown, with darker brown maculation in occipital area. Body: ground colour ochreous to yellowish brown, texture of cuticle rather wrinkled. Entire body covered by extensive pattern of darker brown lines. Lateral area somewhat lighter. Ventral area of same coloration as dorsal side, but greenish white between A6 and A10. Thoracic legs brown, prolegs also, but paler on sides. Variation: in this instar, ground colour varies between greenish and various shades of brown. Described above is the most common form. Some of the greenish larvae exhibit a series of black spots in lateral area. Pupa: shape of cremaster as in Fig. 6c.

DIAGNOSIS. This species may be recognized by its broad wings, ochreous rather than grey colour, and the heavy development of the basal and median line on the fore wing, at least on the dorsum. Its distribution is largely confined to southern Africa. In facies, 35. *I. megasaccus* is similar, although markedly smaller in size. The differences in genitalic structure are obvious from the illustrations.

BIOLOGY. I reared this species on *Acacia karroo* Hayne (= *A. natalitia* E. Meyer); this foodplant is also

listed by Taylor (1953; 1965). In the subtropical coastal forests of KwaZulu-Natal, also at Cape Vidal ( $28^{\circ}08'S$   $32^{\circ}33'E$ ), the moths appear to form discrete colonies that may include several dozen individuals. Adults have been collected throughout the year.

**DISTRIBUTION** (Fig. 983). From southern Africa (South Africa, Namibia, Moçambique and Zimbabwe) northwards to Tanzania. In southern Africa mostly recorded along the eastern coast from  $25^{\circ}E$  eastwards and in the eastern Transvaal.

**MATERIAL.** 93♂ (4 dissected, TM genitalia slides No. 1393, 1393a, 11002; slide L 685 (NMBZ)) and 78♀ (2 dissected, TM genitalia slides No. 11003, 11145). 1 Paris (MNHN), 5 Bulawayo (NMBZ), 136 Pretoria (TM), 2 Pretoria (SANC), 8 Cape Town (SAM), 10 N.J. Duke collection, 7 H.S. Staude collection, 2 D.M. Kroon collection.

**LOCALITIES.** **South Africa, Transvaal:** [Northern Province]: Ofcolaco (13), Selati (1). [North-West]: Rustenburg (1). [Mpumalanga]: Nelspruit, 'De Hoop' (1), Erasmus Reserve near Pilgrim's Rest (1), Barberton (5), Waterval Onder (1), Noordkaap (1), Pullen Farm, Krokodilpoort Mts (1), Louw's Creek (1). **Free State:** Sasolburg (2). **KwaZulu-Natal:** Cape Vidal (25), M'fongosi (1), St. Lucia (11), Dukuduku Forest (1), Umkomas (5), Lowdrift/Mkuzi (1), Hluhluwe (1), Richard's Bay (9), Ndumu (2), Pinetown (1), Scottburgh (1), Krantzloof (1), Jozini Dam (3), Durban (1), Mapelana (5), Chaos/Mkuze (1), Colenso (1). **Cape Province:** [Eastern Cape]: East London (9), Kasonga (1), Uitenhage (1), Addo (2), Hilton, Grahamstown (7), Port Elizabeth (3), Fort Beaufort (3), Hankey (1), Beacon Bay (8), Dunbrody (1), Umtata (1), The Haven (2), Port St. John's (9). [Western Cape]: Kleine Monde, Bathurst Distr. (1). Ambiguous: Waterford (1). **Moçambique:** Umbeluzi River, 20 m S. Lourenço Marques (1), Bela Vista (1). **Namibia:** Abachaus (2), Okahandja (1). **Zimbabwe:** Vumba (1), Mutare (Umtali) District (2), Mazoe (1), Insiza (1), Wankie (1), Msali Bridge (3), Matopos Research Station (1), Matsheamhlope/Bulawayo (1). **[Tanzania]:** DOA, Tanga (1), N., Loliondo, NW. Lake Natron (1).

### 33. *Isturgia arizeloides* sp. n.

Figs 147–149; 576, 805; 984

**TYPE MATERIAL.** Holotype ♂, [South Africa, Northern Province]: Pafuri, K[Ruger] N[ational] P[ark] Survey, 1.XII.1964 (Vári & Potgieter) (TM). Paratypes (31♂, 10♀). [South Africa, Northern Province]: 11♂, 1♀, same data as holotype; 3 dissected, TM Lep. Het. Genitalia slide Nos. 11066, 11206, 11207; 2♂, *ibidem*, 20.III.1985 (R. B. Toms); 2♂, Pretoria, 23.XII – 7.I.1974 (J. du Buy); 1♀, Naboomspruit, Mosdene

Nature Reserve, 16–20.III.1976 (M.J. Scoble); TM Lep. Het. Genitalia slide No. 11170. [North-West]: 1♂, Pilanesberg National Park, Sour Bushveld, 1200 m,  $25^{\circ}11'23''S$   $27^{\circ}8'30''E$ , 6–7.XI.1992 (H.S. Staude).

**KwaZulu-Natal:** 2♂, 1♀, Mkuze, Chaos,  $27^{\circ}39'49''S$   $32^{\circ}E$ , Dry mixed savanna, 220 m, dated 5.IX.1992 (2♂) and 23.XII.1992 (♀) (H.S. Staude); H.S. Staude genitalia slide No. 4. **[Namibia]:** 1♂, Abachaus, S[outh] W[est] A[Africa], July [19]43 (G. Hobohm); TM Lep[idoptera] Het[erocera] Genitalia slide No. 11219 1♀, *ibidem*, dated VI.1942 (G. Meyer); 7♂, 2♀, Okahandja, dated 22.I.[19]48 (♂) (genitalia slide No. W1 (SMWN)), 22.II.[19]48 (♂), 20.III.[19]48 (♂, ♀), 26.III.[19]48 (♂), 11.VI.[19]48 (♂), 13.VII.[19]48 (♂), 14.VIII.[19]48 (♀) (F. Gaerdes); 1♀, Otjimambi, V [19]49 [F. Gaerdes]. **[Zimbabwe]:** 1♂, (S. Rhodesia), Hot Springs, Mutare (Umtali) District, 20.I.1934 (P.A. Sheppard) (TM Lep. Het. Genitalia slide No. 11069); 1♀, Umtali District, S[outhern] Rhodesia, 27.8.1935 (P.A. Sheppard) (TM Lep. Het. Genitalia slide No. 11031); 1♀, (S.E. Rhodesia), Chikwarakwara Dip, Chipese T.T.L.; 8.XII.1974, Nat[ional] Mus[eum] Bulawayo (F. de Moor-Fall[con] Col[lege] Expl[edition]); 1♂, 1♀, *ibidem*, Base Camp, dated 8.XII. (♂) and 11.XII.1974 (♀); 1♂, 1♀, *ibidem*, Bubye Bridge, dated 1.XII.1974; 1♂, *ibidem*, Store Pan, dated 4.XII.1974; 1♂, Chikwarakwara Forest, W. of Bubi, Limpopo R[iver], 3.V.1968 (E. Pinhey); 1♂, Limpopo R[iver] 10 mls E. of Shashi R[iver], 8–12.V.1967 (A.J. Miller); 1♂, S. Rhodesia, 96 m SE. of Nuanetsi,  $21^{\circ}55'S$   $31^{\circ}30'E$ , April 1961, Nat. Mus. S.R. **Moçambique:** 1♂, Umbeluzi River, 20 mls. S. of Lourenço Marques, 22.XII.1967, leg. E. Pinhey, Nat[ional] Mus[eeum] S[outhern] Rhodesia; genitalia slide L 697 (NMBZ) (TM, SMWN, NMBZ, H.S. Staude collection).

**FORE WING LENGTH.** 12–16 mm (♂), 13–16 mm (♀).

**ADULT** (Figs 147–149). Small to medium-sized. Ground colour of wings whitish, densely striated with grey-brown; general appearance brownish rather than grey. On forewings, basal and postmedian lines fine, weakly to prominently developed; the latter in well-marked specimens bordered distally by darker grey band. Median line broad, but mostly indistinct and rather pale. In ♀, lines generally reduced. Discal spots on forewing rather large, elliptical, but not conspicuous. On hind wing, median line weaker or absent and postmedian also less prominent.

Underside: chalk-white to cream with brown dusting in basal and median area; median line faint, discal spots clear. Postmedian area brown, more of ground colour towards termen. Vestiture of thorax and abdomen pale ochreous, finely dusted with grey. Hind tibia of ♂ not modified. Setal comb on A3 absent. **Variation.** *Isturgia arizeloides* is a variable species with regard to size and development of the lines on the forewings. Specimens

from Namibia are relatively largest and characterized by very weak markings.

**MALE GENITALIA** (Fig. 576). Uncus mitre-shaped; gnathos with broad medial element. Costa of valve slender, curved and tapering towards apex. Sacculus triangular, rounded dorsally and ventrally and having termen very finely serrated. Saccus extended into a short, broad tip. Aedeagus stout, large relative to size of genital capsule; apical half bearing a serrated sclerotized ridge. Vesica with a long and curved, sword-like apical cornutus arranged parallel to dorsal sclerotized ridge and a second, slightly curved rod-like cornutus situated in anterior half. Octavals furcate, acutely pointed, surface of inner margin scobinate.

**FEMALE GENITALIA** (Fig. 805). Papillae anales fairly small, occasionally appearing slightly swollen. Both pairs of apophyses slender, a. anteriores rather more than two-thirds length of a. posteriores. Lamella postvaginalis broad, crescentic. Operculum triangular, rounded. Bursa copulatrix massive, pipe-shaped, with heavily sclerotized, ribbed ductus and comparatively small corpus bursae. Signum large.

**DIAGNOSIS.** In the male genitalia, this species is characterized by the sclerotized dorsal ridge of the aedeagus and the combination of an apical sword-like and an anterior rod-like cornutus. The female, while resembling externally most of the other species of this group, is unique in regard to the shape of the bursa.

**BIOLOGY.** *Isturgia arizeloides* is associated with relatively dry savanna. Adults have been collected in January–September and November–December.

**DISTRIBUTION** (Fig. 984). Restricted to southern Africa and recorded from South Africa (locally in KwaZulu-Natal, Northern Province and North-West), southern and eastern Zimbabwe, northern central Namibia, and southern Moçambique.

**FURTHER MATERIAL.** 1♂, [Namibia]: Okahandja, SWA, 15.VIII.1955 (F. Gaerdes); TM Lep. Het. Genitalia slide No. 11030. The genitalia preparation revealed that the abdomen of a ♀ of *Isturgia supergressa* (Prout) had been attached to this specimen.

**ETYMOLOGY.** From Greek εἰδος, τό, form, appearance, and *I. arizela* Fletcher; the two species are similar.

### 34. *Isturgia albogrisea* sp. n.

Figs 150, 151; 577, 806

**TYPE MATERIAL.** Holotype ♂, [Tanzania]: Amani, Usambara, Dec[ember] 1961, Tanganyika (G. Pringle); Amani P 737. 12.61/P.737; genitalia slide M. Krüger No. 19 (NMKE). Paratype (1♀). **Kenya:** Mtito Andei, Apr[il] 1966 (R.H. Carcasson); genitalia slide M. Krüger No. 20 (NMKE).

**FORE WING LENGTH.** 12 mm (♂), 14 mm (♀).

**ADULT** (Figs 150, 151). Of medium size. Ground colour of wings chalk-white, with irregular grey dusting, particularly along costa. Postmedian area suffused with grey. Lines greatly reduced, but their position marked by more or less complete rows of black spots and larger such spots where basal and median line meet costa and dorsum of fore wing. Discal spots well developed, larger on fore wing. Underside similar, but irrations and suffusion of postmedian area more mixed with brown. Vestiture of thorax and abdomen grey. Hind tibia of ♂ not modified. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 577). The mitre-shaped uncus prominent; gnathos as described for the group, rectangular. Costa of valve long and curved, somewhat dilated apically. Sacculus also long, comparatively slender. Saccus forming a broad, rounded tip. Aedeagus stout and cylindrical, with a large, serrated, blade-like apical cornutus and a much smaller, rod-like median cornutus. Octavals furcate and deeply emarginate, very large.

**FEMALE GENITALIA** (Fig. 806). Papillae anales well developed. Both pairs of apophyses long and slender; a. anteriores about two-thirds length of a. posteriores. Sterigma: l. antevaginalis rather small, semicircular. Operculum cone-shaped. Bursa copulatrix pipe-shaped as in other members of the group, relatively small. Signum very prominent.

**DIAGNOSIS.** In facies, *I. albogrisea* can be separated from other, similar members of the group by the pure whitish-grey coloration of the upperside which lacks all trace of brown. In the male genitalia, the enormous octavals at once characterize the species. In the female genitalia, the operculum, rather short ductus bursae and very prominent signum are typical.

**BIOLOGY.** Most likely a savanna species like the other members of this group. The type specimens were collected in April (Kenya) and December (Tanzania).

**DISTRIBUTION.** East Africa, with a single record each from Kenya and Tanzania.

**ETYMOLOGY.** From Latin *albus* (-a, -um), white and *griseus* (-a, -um), grey; for the colour on of the upperside of the wings.

### 35. *Isturgia megasaccus* sp. n.

Figs 152, 153; 578, 807

**TYPE MATERIAL.** Holotype ♂, **Kenya:** Malili, Feb[ruary] 1992, (J. Marohasy); X-Acacia *nilotica*, Leaf feeder; 92-2; IIE22298; Presented by Int[ernational] Inst[itute] [of] Ent[omology] BM. 1992-1; *Tephrina* sp. determinavit J.D. Holloway 1992

(BMNH). Paratypes (3♂, 4♀). **Kenya:** 3♂, 2♀, same data as holotype (2♂, 1♀ dissected, Geometridae genitalia slides No. 15905, 16171, 16172) (BMNH). 1♀, [Kenya]: Marigat, 4000 f[ee]t, K[enya] C[olony], Oct[ober] 1949 (R.T. Evans). 1♀, **Tanzania:** Africa, Tanzania, Usa River, 3900 ft., 1.V.1965, leg[it] Dr. Szunyoghy; Geometridae genitalia slide No. 10063 (BMNH, NMKE).

FORE WING LENGTH. 11–13 mm (both sexes).

**ADULT** (Figs 152, 153). Barely medium-sized. Antennae of ♂ with a characteristic mottled appearance, the rami being alternately white and blackish. Ground colour of wings cream white to ochreous with darker greyish dusting of varying intensity, though apparently denser in ♂. Postmedian area of wings somewhat darker, in some specimens with a rather large but not well defined darker spot. Basal and median lines weak to rather bold, but faint; postmedian line present but usually very fine. Discal spots present but indistinct. Underside of same coloration; postmedian area of both wings with a broad, greyish-brown fascia. Vestiture of thorax and abdomen ochreous-grey. Hind tibia of ♂ not modified. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 578). Uncus rounded; gnathos strongly angular. Costa of valve straight and not dilated apically; its base with a row of setac. Sacculus rather pointed, with a small and localized sclerotization. Saccus strongly developed and extended to form a very long tip. Aedeagus elongated, slender and strongly curved; vesica bearing with a single, large cornutus. Octavals furcate and fairly deeply emarginate; most of surface scobinate.

**FEMALE GENITALIA** (Fig. 807). Papillae anales normal. Both pairs of apophyses slender, with a. anteriores rather more than two thirds length of a. posteriores. Sterigma: lamella ante vaginalis crescentic. Operculum large, with concave distal margin. Bursa copulatrix small. Ductus bursae long and narrow, strongly ribbed; corpus bursae small and membranous. Signum very small, irregular.

**EARLY STAGES.** Although most specimens from the type series were reared, no description of egg or the larval stages are available.

**DIAGNOSIS.** Externally, darker, whitish-grey specimens strongly resemble 27. *I. sublimbata*, while lighter and more cream-coloured examples (so far only females) are much like 20. *I. disputaria*. However, the mottled antennae of the male of *I. megasaccus* permit ready identification. In the male genitalia, the species is at once recognizable by the extremely developed saccus.

**BIOLOGY.** In captivity, specimens reared on *Acacia nilotica* (L.) Willd. ex Del. emerged in February, while

the only specimen collected at light was taken in October.

**DISTRIBUTION.** Kenya and Tanzania.

**ETYMOLOGY.** From Greek μέγας, very large, and *saccus*, the posteriormost portion of the vinculum; on account of the unusually large size of that structure.

### 36. *Isturgia presbitaria* (Swinhoe, 1904) comb. n.

Figs 154, 155; 579, 808

*Tephritis presbitaria* Swinhoe, 1904: 511. Holotype ♂, [Kenya]: Atthi Valley, B[ritish] E[ast] Africa, 4000 ft, 16.XII.[18]98 (R. Crawshay). 99–216; *Tephritis presbitaria* Swinhoe ♂ type; Genitalia slide Geom[etridae] 1951–200 (BMNH) [examined].

*Tephritis presbitaria* Swinhoe; Hampson, 1909: 121; 1910: 468; Janse, 1932: 239 (as synonym of *deerraria*); Fletcher, 1978a: 77.

FORE WING LENGTH. 13–15 mm (♂), 15 mm (♀).

**ADULT** (Figs 154, 155). Medium-sized; wings elongated. Ground colour cream, striated and dusted with pale brownish grey; postmedian area more or less completely suffused with that colour. Lines mostly weak; complete on fore wing; hind wing lacking basal line. Median line on fore wing in males bold but not reaching costa. A dark round spot, weak in some specimens, bordering postmedian on fore wing. Discal spots rather large and elliptical on fore wing, small and round on hind wing. Markings less complete in ♀. Underside whitish with orange-brown striation, particularly along fore wing costa. Development of lines varying, as on upperside. Postmedian area suffused with orange brown, leaving some whitish blotches along termen. Vestiture of thorax and abdomen pale ochreous-grey, mixed with darker scales. Hind tibia of ♂ not modified. A3 not preserved in males examined.

**MALE GENITALIA** (Fig. 579). Uncus and gnathos as described for the group. Costa of valve curved, tapering apically. Sacculus broadly rounded, its outer margin only very weakly serrated. Saccus terminating in a broadly rounded tip. Aedeagus spindle-shaped, somewhat curved and tapering anteriorly. Vesica with one large, smooth and a second, scobinate cornutus. Octavals large and furcate, surface scobinate.

**FEMALE GENITALIA** (Fig. 808). Papillae anales pointed. Apophyses moderately stout, a. anteriores about two-thirds length of a. posteriores. Sterigma not preserved in examined specimen. Operculum cone-shaped. Antrum relatively short. Ductus bursae typical for the group, pipe-shaped. Corpus bursae rounded and membranous, bearing a large signum.

**DIAGNOSIS.** This species resembles a number of other

species of *Isturgia* such as 28. *arizela* and 30. *inaequivirgaria*, so that dissection of the genitalia is necessary for reliable identification. In the male genitalia, important characters are the broadly rounded sacculus, configuration of cornuti on the vesica and rather blunt octavals. In the female, the shape of the operculum and the rather large corpus bursae are typical.

**BIOLOGY.** Practically unknown, partly due to confusion with other, similar *Isturgia* species. *I. presbitaria* has been collected in dry savanna as well as in more forested areas. Recorded altitudinal range is 1150–2000 m. Adults have been collected April to June.

**DISTRIBUTION.** Incompletely known and recorded from widely separated localities in Angola, Uganda, Tanzania, and Ethiopia.

**MATERIAL.** 7♂ (2 dissected, Geometridae genitalia slides No. 9653, 9655) (BMNH) and 13♀ (3 dissected, Geometridae genitalia slides No. 9651, 9654, 10061) (BMNH). 20 London (BMNH).

**LOCALITIES.** **Angola:** Quirimbo, 75 km E. of P. Amboim (1). **Tanzania:** Katesh, 5900 ft (1). **Uganda:** SE. Ruwenzori, 3500 ft (3). **[Ethiopia]:** Abyssinia, Dire Daoua (15).

### 37. *Isturgia virescens* sp. n.

Figs 156; 580, 809

**TYPE MATERIAL.** Holotype ♂, **Rwanda:** Centre-Sud, Karama Bugesera (Savane arborée), 1400 m, 10–14.ii.1977 (B. Turlin); *Tephrina presbitaria* Swinh. Londres 1980 [misidentification]; genitalia slide Herbolut No. 2 (C. Herbolut collection). Paratype (1♀). **Rwanda:** *ibidem*, dated 27.XII.1975; genitalia slide No. 3 (C. Herbolut collection).

**FORE WING LENGTH.** 14 mm (♂), 15 mm (♀).

**ADULT** (Fig. 156). Well medium-sized. Ground colour of wings cream, densely irrorated and suffused with greenish grey, more heavily so on fore wing and in postmedian area of both wings. All three lines present on fore wing but incomplete and rather faint, their position on costa and tornus of fore wing marked by dark maculae. Discal spots present but not conspicuous. Underside cream, densely and unevenly striated with light olivaceous green. Postmedian area showing a broad fascia of that colour. Median line and discal spots well developed. Vestiture of thorax and abdomen pale ochreous to grey, mixed with some darker scales. Hind tibia of ♂ not modified. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 580). Uncus as described for the group; gnathos somewhat lyre-shaped. Costa of valve narrow, strongly curved. Sacculus broadly triangular, with rounded apex. Saccus well developed,

broadly rounded. Aedeagus stout, with pointed apex. Vesica bearing two long cornuti (one apical, one median), as well as a rather weak serration in anterior half. Octavals deeply furcate, with scobinate tips.

**FEMALE GENITALIA** (Fig. 809). Papillae anales slender. Apophyses rather robust; a. anteriores more than two-thirds length of a. posteriores. Sterigma: l. antevaginalis broadly crescentic. Operculum prominent, bell-shaped; antrum curved. Bursa copulatrix pipe-shaped as in other members of the group. Signum large, stellate.

**DIAGNOSIS.** While resembling other members of the group (most notably 36. *I. presbitaria*) in habitus, this species can be recognized by the greenish tinge of the wings which is not present in the other species.

**BIOLOGY.** In its limited area of distribution, *I. virescens* has been collected in tree savanna at an altitude of 1400 m. Adults are active in December and February.

**DISTRIBUTION.** So far only known from a single locality in Rwanda.

**ETYMOLOGY.** From Latin *virescens*, becoming green; on account of the characteristic coloration.

### 38. *Isturgia kiellandi* sp. n.

Figs 157; 810

**TYPE MATERIAL.** Holotype ♀, **[Tanzania]:** Tansania, 18.VI.1960, leg[it] J. Kielland, Staats[amm][un]g München; 18.6.61, Mikinguri, 1800 m [handwritten]; genitalia slide No. 6736 (ZSBS) (ZSBS).

**FORE WING LENGTH.** 15 mm (♀ holotype).

**ADULT ♀** (Fig. 157). Medium-sized. Ground colour of wings cream white, irregularly striated with grey, much more heavily so in postmedian area. All three lines weakly developed. Discal spots on fore wing large, elliptical; on hind wing smaller and circular. Underside pure white with irregular brownish striations; markings as on upperside, though somewhat fainter and more orange-brown. Discal spots prominent. Vestiture of thorax and abdomen mixed ochreous-and-grey.

**FEMALE GENITALIA** (Fig. 810). Papillae anales normal. Apophyses posteriores moderately stout; a. anteriores more delicate, of about the same length. Sterigma: l. antevaginalis large, squarish; l. postvaginalis not modified. Operculum cone-shaped. Ductus bursae strongly developed; heavily sclerotized and sculptured. Corpus bursae membranous, with prominent circular signum.

**DIAGNOSIS.** In facies, the species is perhaps closest to 23. *I. deerraria*, but is, judging from the only speci-

men available, more brownish in coloration, with large, elliptical discal spots on the fore wing. Also, the underside of the wings appears to be whiter than in *deerraria*. For reliable identification, however, examination of the genitalia is necessary. Here, *I. kiellandi* is best recognized by the shape of the sculptured, strongly sclerotized ductus bursae.

**BIOLOGY.** Probably a savanna species. The holotype was collected in June at an altitude of 1800 m.

**DISTRIBUTION.** Tanzania.

**ETYMOLOGY.** Named after the collector of the type series, the late Jan Kielland of Börøy, Norway, who contributed much to our knowledge of East African Lepidoptera, notably butterflies.

### Species of uncertain group placement (alphabetical):

#### 39. *Isturgia devecta* (Herbulot, 1966) comb. n.

Figs 158; 581, 811

*Ectropis devecta* Herbulot, 1966: 219. Holotype ♀,

**Madagascar:** Tuléar, abords immédiats de la ville, 27-XII-1964 (C. Monicr) (C. Herbulot collection) [not examined]. The identity was established from the original description.

*Tephrina devecta* (Herbulot); Herbulot, 1981b: 133.

**FORE WING LENGTH.** 13–15 mm (both sexes).

**ADULT** (Fig. 158). Barely medium-sized. Wings narrow and elongated, ground colour cream, with irregular greyish-brown suffusion creating a bark-like pattern, leaving a pale median fascia. Basal and postmedian line well developed on fore wing, both angled below costa; median faint. Three small dark maculae present where lines meet costa. On hind wing, all lines very faint. Discal spots dark brown, well developed. Underside cream white with brownish-grey striation. Discal spots large. Postmedian area wholly suffused with brownish grey except for cream blotches at apex, near middle of fore wing and at anal angle of hind wing. Vestiture of thorax and abdomen ochreous-grey. A3 with setal comb present.

**MALE GENITALIA** (Fig. 581). Uncus dome-shaped; gnathos cingulate and prominent, heavily sclerotized. Costa of valve narrow, strongly curved, its dorsal portion sclerotized. Sacculus straight, blade-like. Adeagus short and cylindrical, apical region sclerotized dorsally, sclerotization ending in two small teeth. Vesica bearing a row of small cornuti at tip. Octavals weakly sclerotized, shallow.

**FEMALE GENITALIA** (Fig. 811). Papillae anales narrow, elliptical. Both pairs of apophyses delicate, a,

anteriores approximately two-thirds length of a. posteriores. Sterigma not modified. Bursa copulatrix pyriform, with gradual transition from ductus to corpus; ostium bursae conspicuously wide and well sclerotized. Signum small, evenly rounded.

**DIAGNOSIS.** The markings are quite atypical for an *Isturgia* species, and are much closer to the general boarmiid, bark-like pattern. The only similar Afrotropical macariine is 120. *Chiasmia boarmioides*, which, however, has broader wings and does not occur in Madagascar.

**BIOLOGY.** The species is rare in collections and occurs in the north, south and west of Madagascar, where it is associated with dry forest. Adults are active in December.

**DISTRIBUTION.** Madagascar, absent from eastern and central parts of the island.

**MATERIAL.** 1♂ (dissected, genitalia slide C. Herbulot No. 5698) and 1♀ (dissected, Pr[éparation] C. Herbulot No. 15) (C. Herbulot collection).

**LOCALITIES.** **Madagascar:** N., Ankorika (1); W., Forêt de Manomby, 62 km E. Morondava (1).

#### 40. *Isturgia famula famula* (Esper) comb. n.]

The nominate subspecies does not occur in the study area; here, the species is represented by ssp. *brunnea* (Le Cerf). For an account of the distribution see Rödel & Trusch (1997).

*Noctua famula* Esper, 1787: pl. 106, Fig. 4 (non binomial); 1789: *Die Schmetterlinge* 4: 164 (*Noctua*). Type material: not examined. The identity of the taxon is readily established on the basis of Esper's illustration.

*Bichroma famula* (Esper); Warnecke, 1939: 394; Forster & Wohlfahrt, 1981: 225.

#### 40a. *Isturgia famula brunnea* (Le Cerf, 1923) comb. n.

Figs 159; 582, 812

*Bichroma famula* f. *brunnea* Le Cerf, 1923: 198. Holotype ♂, [Morocco]: Type; Harcha (MA), Avril 1922; Muséum Paris, don de H. Ungemach; *Bichroma famula* subsp. *brunnea* Le Cerf, Bull. Soc. ent. France 1923 p. 198 (P. Viette VIII-1952) (MNHN) [transparency in BMNH examined].

*Fidonia famula* (Le Cerf); Meade-Waldo, 1905: 387.

*Bichroma famula brunnea* Le Cerf; Rothschild, 1925: 147; Wehrli in Seitz, 1940: 393; Toulgoët, 1963: 45 Rungis, 1981: 261.

*Bichroma famula* Esper; Blachier, 1908: 222; Audeoud & Roch, 1938: 368.

FORE WING LENGTH. 11–13 mm (♂); 11–12 mm (♀).  
 ADULT (Fig. 159). Small moths; forewings with rounded apex. Antennae of male bipectinate with short rami; of female, filiform. Ground colour of forewings orange, strongly suffused with dark purplish brown, but fainter over median area. All three lines and discal spots present but indistinct to virtually obsolete. Postmedian area bearing a row of dark spots. Hind wings orange with fairly intense purplish-brown dusting. Median and postmedian lines present but faint, undulating. Discal spots very small. Cilia indistinctly chequered white-and-brown. Underside of forewings orange, suffused with greenish-white along costa and most of termen. Postmedian row of black spots prominently developed; discal spots of medium size. Underside of hind wings also orange but densely sprinkled with whitish-green. Discal spots very small. Body entirely clad in rough, dense hairs, blackish, mixed with greyish-green and whitish hairs.

MALE GENITALIA (Fig. 582). Uncus broadly triangular. Gnathos practically semicircular, with broad arms but lacking appreciably developed medial element. Genital capsule broad, angular; saccus short and broadly rounded. Juxta weakly developed. Valvae with long, spatulate costa and short, rounded sacculus. Aedeagus small relative to size of genital capsule, vesica lacking cornuti.

FEMALE GENITALIA (Fig. 812). Papillae anales normally developed. Apophyses relatively strong, a. anteriores approximately two-thirds length of a. posteriores. Sterigma not modified. Ostium bursae wide-mouthed, leading into a short, narrow antrum. Bursa copulatrix pear-shaped, thinly membranous, with gradual transition between ductus and corpus. Signum rounded, stellate, with short spicula.

DIAGNOSIS. The wing pattern is characteristic.

BIOLOGY. The habitat is given by Rungs (1981) as plains and low elevations of mountains near the Atlantic coast. Adults have been collected from March to May, depending on altitude. Meade-Waldo (1905) records the species as being abundant in the Forest of Marmora in western Morocco. In the central European part of its range the larvae feed mainly on *Sarrothamnus scoparius* Koch and, more rarely, *Genista tinctoria* L. and *Laburnum anagyroides* Medic. in Vorles. Churpf. Phys. Ges. 2 (1787), whereas Spanish populations utilize species of *Retama*. See also Rödel & Trusch (1997).

DISTRIBUTION. Morocco.

MATERIAL. 20 ♂ (1 dissected, Geometridae genitalia slide No. 19983) (BMNH) and 8 ♀ (1 dissected, Geometridae genitalia slide No. 19984) (BMNH). 22 London (BMNH), 6 Bonn (MAKB).

LOCALITIES. Morocco: Bab-Rmila (13), Mrassine (15).

#### 41. *Isturgia geminata* (Warren, 1897) comb. n.

Figs 160; 583, 813; 985

*Tephrina geminata* Warren, 1897a: 113. LECTOTYPE ♂, here designated, [South Africa, KwaZulu-Natal]: Weenen, Natal, X.[18]93; *Tephriopsis* [sic] *geminata* Warr. ♂ Type; Type; Rothschild Bequest B.M. 1939–1 (BMNH) [examined].

*Tephrina bilineata* Warren, 1898a: 35. Holotype ♀, [South Africa, Mpumalanga]: Barberton, S.E. Africa (Rendall); *Tephrina bilineata* Warr. Type ♀; Type; Rothschild Bequest B.M. 1939–1 (BMNH) [examined].

*Tephrina geminata* Warren; Janse, 1917: 112; 1932: 241.

*Tephrina bilineata* Warren; Janse, 1932: 241 (synonymy).

FORE WING LENGTH. 10–12 mm (♂), 10–13 mm (♀).

ADULT (Fig. 160). Small. Ground colour of wings pale lemon-yellow, irregularly dusted with ochreous, more heavily so in postmedian area. Basal line present on fore wing only, straight but rather inconspicuous; median line absent; postmedian well developed, broad and heavy, ochreous. Discal spots blackish, small but distinct. Underside similar, but with heavier dusting. Vestiture of thorax and abdomen concolorous with wings. Hind tibia of ♂ dilated. Setal comb on A3 absent.

MALE GENITALIA (Fig. 583). Uncus triangular, arising from broad base and terminating in short, beak-like hook; gnathos well developed, cingulate. Valve massive; costa strongly curved, not dilated apically; sacculus large, distal margin extended to form a prominent, curved process. Aedeagus stout, wedge-shaped and slightly cleft apically; a single median cornutus present, apparently formed by a conglomerate of numerous microcornuti. Octavals absent, but central part of segment A8 with slightly denser sclerotization.

FEMALE GENITALIA (Fig. 813). Papillae anales well developed. Both pairs of apophyses strong; a. anteriores about two-thirds length of a. posteriores. Sterigma forming some small, discrete sclerotizations. Antrum rather wide. Bursa copulatrix resembling an elongated tube. Signum small and circular, with very short spicula.

DIAGNOSIS. Very characteristic in facies and not likely to be confused with any other species.

BIOLOGY. The species is practically confined to subtropical savanna. Adults have been collected from January to March, in May, and from September to December.

DISTRIBUTION (Fig. 985). South Africa, found mostly in Transvaal and KwaZulu-Natal provinces, including the former Transkei.

MATERIAL. 54♂ (2 dissected, TM genitalia slides No. 945, 10998) and 55♀ (2 dissected, TM genitalia slides No. 10999, 11233), 74 Pretoria (TM), 6 Cape Town (SAM), 15 Bulawayo (NMBZ), 11 N.J. Duke collection, 3 H.S. Staude collection.

LOCALITIES. **South Africa, Transvaal:** [Northern Province]: Lekkerwater (1), Lemana (1), Three Sisters (10), Haenertsburg (1), Moordrift (2), Woodbush Village (1), Louis Trichardt (2), Wyllie's Poort (1), Buzzard Mountain Retreat, Soutpansberg (3), Soutpansberg, Farm Oldreive's (14), Cloud's End Hotel (1). [Mpumalanga]: Barberton (14), Waterval Boven (1), Waterval Onder (17), Tzaneen (2). **Free State:** Harrismith (1). **KwaZulu-Natal:** Stella Bush (1), Eshowe (7), Umhlali (2), Melmoth (1), M'fongosi (2). **Cape Province:** [Eastern Cape]: Port St. John's (14), The Haven (11).

#### 42. *Isturgia perplexa* sp. n.

Figs 161; 584; 977

TYPE MATERIAL. Holotype ♂, [Zimbabwe]: S[outhern] Rhodesia, Busi Farm, Chippinga, Jan[uary], Feb[ruary] 1979 (D. Townley), Nat[ional] Mus[eum] S[outhern] Rhodesia; genitalia slide L 681 (NMBZ).

FORE WING LENGTH. 14 mm (♂ holotype).

ADULT ♂ (Fig. 161). Medium-sized, wings relatively broad and rounded. Antennae bipectinate, with rami on apical fifth very short; dorsal aspect of flagellum ochreous, rami speckled brown and ochreous. Ground colour of wings whitish, densely irrorated and striated with greyish brown; postmedian area more or less completely suffused with same colour. Basal and median line reduced except for small remnants of basal on fore wing. Postmedian gently curved and moderately well developed on fore wing, faint on hind wing. Discal spots large and elliptical on fore wing, smaller on hind wing. Underside chalk white, extensively suffused with orange brown, in particular along costa and termen of both wings and with fine and dense, grey to brown striation. Postmedian line and discal spots shining through. Vestiture of thorax and abdomen greyish, mixed with buff on the underside. Hind tibia of ♂ not dilated. Setal comb on A3 absent.

MALE GENITALIA (Fig. 583). Uncus dome-shaped, the attenuated apical portion folded inwards. Gnathos cingulate. Costa of valve straight, appearing swollen near base, and not dilated apically. Sacculus barely more than twice width of costa, triangular and without

sclerotizations. Valvula characterized by small swelling. Saccus moderately long. Aedeagus slender, cylindrical and tapering towards tip. Two curved cornuti of characteristic arrangement present (see illustration). Octavals faintly sclerotized, shallowly w-shaped.

DIAGNOSIS. In facies, *I. perplexa* bears some resemblance to males of 22. *I. exerraria*. However, the cingulate condition of the gnathos is reminiscent of the *supergressa*-group, while the shape of the uncus is unlike that of any other African species of *Isturgia*. The discovery of the ♀ should aid in assigning the correct place to this species.

BIOLOGY. The vegetation at the type locality, Busi Farm, consists of riverine forest (N.J. Duke, *pers. comm.*). The only known specimen was taken in January–February.

DISTRIBUTION (Fig. 977). Restricted to a small area in south-eastern Zimbabwe. The type locality forms part of an extension of the Chimanimani Mountains.

ETYMOLOGY. From Latin *perplexus* (-a, -um), obscure, entangled: the correct position of this species within the genus remains uncertain.

#### SPECIES REMOVED FROM *ISTURGIA*

##### 1. *'Tephrina' camerunensis* Herbuleot, 1973

not illustrated

*Tephrina camerunensis* Herbuleot, 1973b: 58. Holotype ♂, Cameroon: Forêt de Bafut Nguemba, 9 km S.E. de Bamenda, 2080 m, 4–5.IV.1970 (C. Herbuleot et C. Lemaire) (coll. Herbuleot) [examined]. Paratypes (12♂, 20♀). Cameroon: 6♂, 9♀, same data as holotype (one ♀ labelled as 'allotype'); 1♂, *ibidem*, dated 26.III.1970 (P. Darge); 1♂, 7♀, *ibidem*, dated 3–5.IV.1972 (C. Herbuleot); 2♀, *ibidem*, 7.5 km S.E. de Bamenda, 2230 m, 4.IV.1972 (C. Herbuleot); 3♂, 1♀, préfecture de Kumbo, 5 km E. d'Oku, 2120 m (C. Herbuleot) C. Herbuleot collection, partly dispersed to other collections [partly examined].

Male genitalia structure (see illustration in Herbuleot, 1973b) suggests that this species belongs to *Luxaria* Walker (Eutoeini) or a related genus outside Macariini.

##### 4. Genus *ITAME* Hübner, [1823] 1816

*Itame* Hübner, [1823] 1816, *Verzeichnis bekannter Schmettlinge* [sic]: 299. Type species: *Geometra vincularia* Hübner, [1813] 1796, *Sammlung europäischer Schmetterlinge* 5: pl.78, Fig. 402, by subsequent designation by Hulst, 1896, *Transactions of the American Entomological Society* 23: 331

(but cited as *Itama*, an incorrect subsequent spelling of the generic name. Type locality: Europe.

*Itama*; Hübner, 1826, *Verzeichnis bekannter Schmetterlinge*: 50. An incorrect subsequent spelling (Fletcher, 1979).

*Itame* Hübner; Prout in Seitz, 1915b: 401; Wehrli in Seitz, 1940: 395; McGuffin, 1972: 44.

GENERAL APPEARANCE (Figs 162, 163). Well medium-sized macariines of grey or purplish-grey coloration. Wings rounded. Wing pattern simple, lines often more or less reduced; discal spots prominent on forewings, diminutive or reduced on hind wings. Fore wing pattern consisting of basal, median, and postmedian line; median very faint or absent, basal and postmedian better developed, often bordered distally by wide, brown-grey bands. Hind wings lacking markings or with faint postmedian line only. Head: Chaetosemata extended across head, but not prominently so. Antennae of both sexes bipectinate, rami of ♀ shorter. Frons convex, slightly rough-scaled, with a scale-tuft near base. Labial palpi robust, somewhat obtuse and slightly ascending; about 1.5 times diameter of eyes. Proboscis well developed. Legs: slender and rather long; hind tibia of ♂ not modified.

VENATION. See description under *Isturgia*, above.

MALE GENITALIA (Fig. 585). Uncus between dome-shaped and triangular, setose; horns absent. Gnathos cingulate. Saccus deeply emarginate. Valva with slightly recurved costa and complex sacculus. Aedeagus apically with four well-sclerotized prongs. Octavals developed as small, rounded lobes.

FEMALE GENITALIA (Fig. 814). Sterigma well developed, broadly rectangular. Antrum prominent. Corpus bursae with long, ribbed ductus and fairly small, rounded corpus bursae. Signum present.

DISTRIBUTION. In its redefined, strict sense (Scoble & Krüger, *in press*), *Itame* contains a single, possibly two species confined to south-western Europe and northwest Africa (Algeria, Morocco).

## Key to species

- 1 Larger species (fw length 16–17 mm) (Figs 162, 163). Terminal shade not well developed; discal spots on hind wings small. Algeria, Morocco, Tunisia ..... 1. *vincularia* (Hübner), p. 114
- Smaller species (fw length 11 mm) (not illustrated). Terminal shade well developed; discal spots on hind wings large. Morocco ..... 2. *teknaria* Powell & Rungs, p. 115

## Description of species

### [1. *Itame vincularia* (Hübner, [1813] 1796)]

Figs 162, 163; 585, 814

*Geometra vincularia* Hübner, [1813] 1796: pl. 78, Fig. 402. Type material: Europe (lost) [not examined].

The identity of this species is well established.

*Itame vincularia* (Hübner); Oberthür, 1922: 302; Audeoud & Roch, 1938: 356, 368; Wehrli in Seitz, 1940: 396; Agenjo, 1952: 168.

From the north African part of its range, three subspecies have been described, which probably do not represent more than geographical races. They will therefore be treated together in the account that follows.

#### 1a. *Itame vincularia latefasciata* Rothschild, 1914

Fig. 163

*Itame vincularia latefasciata* Rothschild, 1914: 352. Syntype ♂, **Algeria**: Type; Guelt-es-Stel, Centr[al] Algeria, 9. April 1913 (V. Faroult); *Itame vincularia latefasciata* Rothschild. Type; Rothschild Bequest B.M. 1939-1 (BMNH) [examined]. Further syntypes: 4♂,

**Algeria**: Central Algeria, Guelt-es-Stel, April 1912 (Nissen, Jordan & Rothschild); 17♂, 8♀, *ibidem*, April–June 1913 (V. Faroult) (BMNH) [examined].

*Itame vincularia latefasciata* Rothschild; Wehrli in Seitz, 1940: 396.

#### 1b. *Itame vincularia nrassiniaria* (Oberthür, 1923)

Fig. 162

*Tephrina vincularia nrassiniaria* Oberthür, 1923: 249. Fig. 4838. Holotype(s): **Morocco**: Mrassine (BMNH?) [not examined]. Paratypes: 1 ♂ examined. **Morocco**: Maroc, Mrassine, Avril 1921 (H. Powell); Brit. Mus. 1962–360; *Itame vincularia nrassiniaria* Oberthür paratype ♂ (BMNH).

*Itame vincularia mrassiniaria* Oberthür; Prout, 1928d: 119; Zerny, 1936: 92; Wehrli in Seitz, 1940: 396; Rungs, 1981: 262.

*Itame vincularia nrassiniaria* (Oberthür) ♀ f. *atlantis* Prout, 1928d: 120. Syntype ♀, **Morocco**: Type; 40. 27. Tenfecht, Great Atlas, Morocco, 3000–4000 ft.; Dry season, A[t] L[ight]?, 30.iv.–1.v.[19]27 (Le Cerf & Talbot); Bull. Hill Mus ii(2)p. 120; *Itame vincularia nrassiniaria* fem. f. *atlantis* Prout type (BMNH) [examined].

*Itame vincularia nrassiniaria* (Oberthür) ♀ f. *atlantis* Prout; Zerny, 1936: 92.

#### 1c. *Itame vincularia lycoidaria* Herbulet, 1957

not illustrated

*Itame vincularia lycoidaria* Herbulet, 1957: 191. Holotype ♂: **Tunisia**: Djebel Gafsa, ex larva

11.V.1909 (P. Chrétien), reared on *Rhamnus lycoides* (MNHN?) [not examined]. Paratypes: 2, sex not stated, from same locality.

FORE WING LENGTH. 15–18 mm (♂), 15–17 mm (♀).

ADULT (Figs 162, 163). Well medium-sized. Antennae of both sexes bipectinate, rami shorter in ♀. Termina of both pairs of wings rounded. Ground colour of wings light grey to purplish grey, forewings usually slightly darker, and sparsely irrorated with darker brownish-grey. Forewings with all three lines present but fine; basal and median weakly developed to obsolete; postmedian complete. Basal and postmedian lines bordered distally by wide, faint to very prominent brown-grey bands. Position of all three lines on costa marked by dark maculae. Discal spots prominent on forewings, inconspicuous to obsolete on hind wings. Hind wings with almost obsolete postmedian line only. Underside cream with grey suffusion on forewings and grey striation over both pairs of wings. Discal spots minute. Vestiture of body and appendages concolorous with wings. Variation. The three African subspecies differ mostly in the development of the dark border to the basal and postmedian lines on the forewing and the discal spots. These are on average most prominently developed in *Itame vincularia mrassiniaria*, while being faintest in *v. lycoidaria*.

MALE GENITALIA (Fig. 585). Uncus small relative to size of genital capsule, dome-shaped to triangular, setose; horns absent. Gnathos cingulate. Genital capsule broadly elliptical, with deeply emarginate saccus. Valva with stout, slightly recurved costa and complex sacculus as illustrated. Juxta broadly triangular, not well defined. Aedeagus strongly sclerotized, stout, strongly widening anteriorly and bearing four well-sclerotized apical prongs. Octavals resembling small, rounded lobes separated by a shallow cleft.

FEMALE GENITALIA (Fig. 814). Papillae anales broadly elliptical, setose. Apophyses thin, a. anteriores about two-thirds length of a. posteriores. Sterigma prominent, roughly rectangular in outline, with concave posterior margin. Antrum taking the shape of a wide-mouthed funnel. Ductus bursae long and narrow, well sclerotized, with densely ribbed wall. Corpus bursae small in relation, rounded. Signum well developed,stellate.

DIAGNOSIS. In the study area, the only similar species is *Itame teknaria* below. Adults of *vincularia* are larger; the terminal shade is less well developed, and the discal spots on the hind wing are smaller.

BIOLOGY. The habitat of this species in Morocco is described by Rungs (1981) as plains and low mountains close to the sea. Adults have been collected from February to June; in addition, Rungs (loc. cit.) mentions records in autumn, particularly in southern

Morocco. The larval host plant of ssp. *lycoidaria* is *Rhamnus lycoides* L.

DISTRIBUTION. Morocco, Algeria and Tunisia.

MATERIAL. 21 ♂ (1 dissected, Geometridae genitalia slide No. 19978) (BMNH) and 3 ♀ (dissected, Geometridae genitalia slide No. 19980) (BMNH). 24 London (BMNH).

LOCALITIES. **Algeria:** Guelt-es-Stel near Boghari (1); Hammam-Meskoutine (2); Hammam Rirha (3); Lambese (1) (*latefasciata*). **Morocco:** Mrassine (11); Oudja, Moroccan frontier, 27 km SW. of Lalla-Marnia (1); Zehroun near Mrassine (3) (*mrassiniaria*).

## 2. *Itame teknaria* Powell & Rungs, 1942

not illustrated

*Itame teknaria* Powell & Rungs, 1942: 172. Holotype ♂, [Morocco]: El- Aïoun-du-Dra, 9.IX.1941 (C. Rungs) (coll. Rungs, in MNHN?) [not examined]. Paratype (1 ♂). Same data as holotype (coll. Rungs, in MNHN?) [not examined].

*Itame teknaria* Powell & Rungs; Rungs, 1945: 41; 1981: 262.

FORE WING LENGTH. 11 mm (♂).

ADULT ♂. As no material was examined, a translation of the original description is provided. Male: small species of generally ash-grey coloration. Frons ochreous, marked narrowly with white at the base; vertex white; collar reddish. Palpi ochreous. Antennae white with long black pectinations, white at the tip. Thorax dirtyish-white, spotted anteriorly with red. Abdomen dirtyish-white, suffused with reddish. Feet beige, tibiae marked with brown exteriorly. Forewings white, finely mottled with grey; costa yellowish, mottled with brown; basal line absent; postbasal line thick and curved exteriorly in its anterior one-third; abruptly bent in the discal cell, then rectilinear and progressively obliterated to the dorsal margin; one oblique, elongated black discal spot; postmedian line thick and oblique in its anterior quarter, curved above vein 6, then rejoining dorsal margin in its outer quarter whilst progressively becoming attenuated and describing a large, externally concave arc; antemarginal line absent, a dark grey, diffuse shade present between the position of that line and the preceding; marginal line represented by small black dots between the veins; cilia grey, traversed by two sombre bands. Underside similar but darker; the discal cell invaded by a sprinkling of black, the veins marked with red. Hind wings white, mottled with clear grey and slightly suffused with reddish; one elongated discal spot; median line grey, indistinct, abruptly curved below vein 5 and followed by a diffuse grey shade leaving a clear ochreous-grey marginal area; terminal line formed

by small black striae extending between the veins; cilia dirtyish-white, with sombre double streaks. Underside of hind wings white, strongly mottled with brown, with a blackish-brown antemedian spot extending between vein 1 and the middle of the cell; discal spots black; a large brown postmedian shade, marked with black and curved between veins 4 and 5; terminal area white, powdered with brown and with some black spots.

**DIAGNOSIS.** Similar to *Itame vincularia* but smaller; apparently distinguished by the well developed terminal shade and large discal spots on the hind wing. The genitalia were not available for examination.

**BIOLOGY.** Adults have been collected in September.

**DISTRIBUTION.** Morocco.

**MATERIAL.** Only known from the two type specimens.

## 5. Genus BOARMOIDES Lucas, 1932

*Boarmioides* Lucas, 1932b, *Bulletin de la Société entomologique de France* 37: 216. Type species: *Pseudoboarmia desertaria* Lucas, 1932a, *ibidem* 37: 167, by original designation (for *Pseudoboarmia* Lucas, 1932). Type locality: Morocco: Taroudant. *P. desertaria* is a junior subjective synonym of *Diastictis colpias* Prout, 1928c, *Bulletin of the Hill Museum Wiley* 2: 36. *Boarmioides* was proposed as the objective replacement name for *Pseudoboarmia* Lucas, 1932 (Fletcher, 1979).

**GENERAL APPEARANCE** (Figs 164, 165). Small and inconspicuous macariines (fw length 10–12 mm) of ochreous-grey coloration. Termen of fore wings, but especially of hind wings weakly scalloped. Fore wings with basal, median and postmedian line, the latter angled below costa, hind wing with median and postmedian, but lines always weakly developed and tending to be obsolete, notably in female. Discal spots minute, other markings absent. Underside off-white, irrorated with brownish-grey; in well-marked specimens upperside pattern showing through. Body concolorous with wings. Head: antennae of male bipectinate; rami very thin relative to width of flagellum, bearing thin cilia. Frons conspicuously tufted. Labial palpi stout and obtuse, drooping, about twice diameter of eyes. Proboscis fully developed. Legs: fore tibia bearing a small epiphysis, hind tibia of ♂ not modified.

**VENATION** (after original description). M<sub>3</sub> absent on hind wings. Sc+R<sub>1</sub> bent and approached by Rs. CuA<sub>2</sub> arising further away from the end of the cell than in *Boarmia* on both wings.

**MALE GENITALIA** (Fig. 586). Uncus lacking horns. Gnathos with broad lateral arms and narrow medial element. Valvae stout, with costa and sacculus not deeply separated, recalling condition in *Macaria*. Saccus not

extended. Octavals proper absent but sternum A8 notched.

**FEMALE GENITALIA** (Fig. 815). Sterigma crescentic. Antrum well developed. Bursa copulatrix small, without clear transition between costa and sacculus. Signum absent.

**DISTRIBUTION.** The genus contains only one species, which is confined in distribution to north-west Africa (Morocco, Algeria).

**REMARKS.** The genitalic structure of *B. colpias* is similar to that of species of *Macaria*, but differences exist in the condition of the sternum of segment A8 (notched in *Boarmioides*, deeply cleft in *Macaria*) and the absence of uncus horns in the present genus. Furthermore, the structure of the antennae of the male of *B. colpias* differs from the bipectinate condition in *Macaria* and other genera of Macariini.

## Description of species

### 1. *Boarmioides colpias* (Prout, 1928)

Figs 164, 165; 586, 815

*Diastictis colpias* Prout, 1928c: 36. Holotype ♀, **Morocco:** 40. 27. Sinis, Great Atlas, Morocco. Dry season, 2800 ft. At light, on plateau, 6.v.27 (Le Cerf & Talbot); Bull. Hill Mus. ii(1)p.36/*Diastictis colpias* Prout fem. type (BMNH) [examined].

*Diastictis colpias* Prout; Prout, 1928d: 120; Zerny, 1936: 92.

*Pseudoboarmia desertaria* Lucas, 1932a: 167. Types: 3 specimens, sex not stated but comprising at least one ♂ [Morocco:] Maroc, Taroudant nov[embre] 1928 and 1929 (MNHN) [not examined].

*Seiunctiothisa colpias* (Prout); Wehrli, 1940: 392; Rungs, 1981: 261.

**ADULT** (Figs 164, 165). See diagnosis for genus above.

**FORE WING LENGTH.** 10–12 mm (♂), 11–12 mm (♀).

**MALE GENITALIA** (Fig. 586). Small but robust. Uncus dome-shaped with slightly notched apex; horns absent. Gnathos with lateral arms recalling cingulate type; medial element narrow and pointed. Genital capsule somewhat hexagonal; saccus broad, with very slightly concave base. Valvae with stout, recurved costa and large, rounded to angular sacculus. Aedeagus fairly small, cylindrical, tip extended into a short, curved process; vesica bearing a single small cornutus. Sternum of segment A8 notched.

**FEMALE GENITALIA** (Fig. 815). Papillae anales large relative to size of abdomen, quite densely setose. Apophyses slender, a. anteriores approximately half the

length of a. posteriores. Sterigma crescentic, tapering at each end. Bursa copulatrix with a well-developed, wide-mouthed antrum; anterior portion of bursa elliptical to pear-shaped, without discernible transition between ductus and corpus bursae, but more strongly sclerotized in posterior half. Signum absent.

**DIAGNOSIS.** The small size and wing markings are characteristic.

**BIOLOGY.** The habitat is given by Rungs (1981) as plains and low elevations of mountains near the Atlantic coast, and the possible foodplant as *Tamarix* sp. According to Rungs (1981), adults have been collected in April and May in the northern Atlas, and from November to March in the southern part of the species' range; specimens in the BMNH collection were collected from May to October.

**DISTRIBUTION.** Morocco and Algeria.

**MATERIAL.** 26 ♂ (1 dissected, Geometridae genitalia slide No. 19980) (BMNH) and 9 ♀ (1 dissected, Geometridae genitalia slide No. 19981) (BMNH). 25 London (BMNH), 10 Bonn (MAKB).

**LOCALITIES.** **Algeria:** Prov. Oran: Perregaux (3), Sidi-bel-Abbes (13), Messer (2); Hussein Dey (3), Moroccan frontier, 15 km SW. of Lalla-Marnia (17995: slide?) (1), Rahama, Oned, 31 hours SE. of Mazagan (1). **Morocco:** S., Taroudant, 820 ft (1); SW., Sous-Mündung (10).

## 6. Genus MACARIA Curtis, 1826

*Macaria* Curtis, 1826, *British Entomology* 3: 132. Type species: *[Phalaena] liturata* Clerck, 1759, *Icones Insectorum rariorum . . .* 1: pl.6, Fig.6, by original designation (but cited as *liturata* Linnaeus, an incorrect authorship). Type locality: not stated [Europe] (Fletcher, 1979).

*Maearia*; Seyffer, 1850, *Jahreshefte des Vereins für vaterländische Naturkunde Württembergs* 5: 114. An incorrect subsequent spelling.

*Macaria* Curtis; Guenée, [1858]: 66; Walker, 1861: 878; Hampson, 1895: 201 Spuler, 1910: 97 (synonymy of *Semiothisa*); Prout, 1915: 346; Janse, 1932: 204 (synonymy of *Semiothisa*); McGuffin, 1972: 15 (synonymy of *Semiothisa*); Forster & Wohlfahrt, 1981: 222; Holloway, 1994: 160.

*Semiothisa* (*Macaria*) Curtis; Wehrli in Seitz, 1940: 386.

*Itame* Hübner sensu Forster & Wohlfahrt, 1981: 228.

Synonymy (alphabetically, after Fletcher (1979) and Scoble & Krüger, *in prep.*):

*Eufitchia* Packard, 1876, *Reports of the U.S. geological and geographical Survey of the Territories (Mouograph Geometrid Moths U.S.)* 10: 200, 247. Type species: *Abraxas ribearia* Fitch, 1848, *Transactions*

*of the New York State agricultural Society* 7: 461, Figs 1–11, by monotypy. U.S.A.: New York.

*Catastictis* Gumpenberg, 1887, *Nova Acta Academiae Caesareae Leopoldino Carolinae germanicae naturae curiosorum* 49: 329, 343, 370. Proposed unnecessary replacement name for *Eufitchia* Packard, which is not preoccupied by *Fitchia* Stål, 1859.

*Diastictis* Hübner, [1823] 1816, *Verzeichnis bekannter Schmetterlinge*: 288. Type species: *Geometra artesiaria* [Denis & Schiffermüller], 1775, by monotypy. A junior homonym of *Diastictis* Hübner, 1818, *Zuträge zur Sammlung exotischer Schmetterlinge* 1: 21 (Pyralidae). The objective replacement name is *Proutictis* Bryk, 1938, q.v.

*Dysmigia* Warren, 1895, *Novitates zoologicae* 2: 134. Type species: *Fidonia loricaria* Eversmann, 1837, *Bulletin de la Société impériale Nat. Moscou* 1837 (6): 59, by original designation. [RUSSIA]: Kazan.

*Elpiste* Gumpenberg, 1887, *Nova Acta Academiae Caesareae Leopoldino Carolinae germanicae naturae curiosorum* 49: 329 (key). Nomenclaturally available, but without included species until Gumpenberg, *ibidem* 65: 297. Type species: *Halia tripluuctaria* Packard, 1873, *Proceedings of the Boston Society of natural History* 16: 26, by subsequent monotypy. [U.S.A.]: California. See also *Symphta* Hulst, 1896, *Gladela* Grossbeck, 1909, and Fletcher, 1979.

*Eupisteria* Boisduval, 1840, *Genera et Index methodicus europaeorum Lepidopterorum*: 192. Type species: *Geometra quinquaria* Hübner, [1822] 1796, *Sammlung europäischer Schmetterlinge* 5: pl. 100, Figs 516, 517, by subsequent designation by Fletcher, 1966, *Entomologist's Gazette* 17: 15. Europe. *G. quinquaria* is a junior subjective synonym of *Geometra brunneata* Thunberg, 1784. See also Fletcher, 1979.

*Eupistheria*; Selys, 1845, *Mémoires de la Société royale des Sciences de Liège* 2(1). Incorrect subsequent spelling.

*Eutropa* Hübner, [1831] 1825, *Zuträge zur Sammlung exotischer Schmetterlinge* 3: 39. Type species: *Eutropa distribuaria* Hübner, [1831] 1825, *ibidem* 3: 39, pl. [101], Figs 586, 587 by monotypy. [U.S.A.]: Pennsylvania.

*Fidonia* Herrich-Schäffer, 1855, nec Treitschke, 1825, *Systematische Bearbeitung der Schmetterlinge Europas* 6: 111, 128; [1856] 1850–1858, *Sammlung neuer oder wenig bekannter aussereuropäischer Schmetterlinge* 1: 31, 48. Type species: *Geometra pinetaria* Hübner, [1799] 1796, *Sammlung europäischer Schmetterlinge* 5: pl. 24, Fig. 130 by designation by Fletcher, 1979: 193. A junior homonym of *Fidonia* Treitschke, 1825, in Ochsenheimer, *Schmetterlinge Europas* 5(2): 435. Available as a replacement name is *Sperauza* Curtis, 1828, q.v. See also Fletcher, 1979.

- Gladela* Grossbeck, 1909, *Entomological News* **20**: 353. Type species: *Haliatripunctaria* Packard, 1873, by original designation (for *Symphera* Hulst, 1896). Proposed as an objective replacement name for *Symphera* Hulst, 1896.
- Grammatophora* Stephens, 1829 [June], *The Nomenclature of British Insects*: 44. Type species: *Phalaena wauaria* Linnaeus, 1758, *Systema Naturae* (Edn. 10) **1**: 522, by subsequent designation by Hulst, 1896; *Transactions of the American Entomological Society* **23**: 331 (but cited as *wavaria*, an incorrect subsequent spelling). Type locality: not stated [Europe]. See also Fletcher (1979).
- Halia* Duponchel, 1829 [April 4], in: Godart & Duponchel, *Histoire naturelle des Lépidoptères, Papillons Français* **7**(2): 107; 1829 [December 12] *ibidem* **7** (2): 400. Type species: *Phalaena wauaria* Linnaeus, 1758, by original designation (but included and designated as *wavaria*, an incorrect subsequent spelling). A junior homonym of *Halia* Risso, 1826, *Histoire naturelle de l'Europe méridionale* **4**: 52 (Mollusca). The objective replacement name is *Grammatophora* Stephens, 1829.
- Philobia* Duponchel, 1829 in Godart & Duponchel, *Histoire naturelle des Lépidoptères, Papillons Français* **7**(2): 105, 195. Type species: *Phalaena notata* Linnaeus, 1758, *Systema Naturae* (ed. 10) **1**: 523, by original designation. Europe.
- Physostegania* Warren, 1894, *Novitates zoologicae* **1**: 406. Type species: *Stegania pustularia* Guenée, [1858], in Boisduval & Guenée, *Histoire naturelle des Insectes (Species général des Lépidoptères)* **10**: 49, by original designation. North America.
- Psystegania*; Dyar, [1903] 1902, *Bulletin of the U.S. National Museum* **52**: 305. An incorrect subsequent spelling.
- Prouticis* Bryk, 1938, *Parnassiana* **5**: 54. Type species: *Geometra artesiaria* [Denis & Schiffermüller], 1775: 102, by monotypy (of *Diastictis* Hübner, [1823]). [Austria]: Vienna district. *Prouticis* was proposed as the objective replacement name for *Diastictis* Hübner, [1823].
- Psamatodes* Guenée, [1858], in Boisduval & Guenée, *Histoire naturelle des Insectes (Species général des Lépidoptères)* **10**: 107. Type species: *Psamatodes rinosa* Guenée, [1858], *ibidem* **10**: 110, by designation by Fletcher, 1979: 173. Brazil.
- Psammatodes*; Packard, 1876, *Reports of the U.S. geological and geographical Survey of the Territories (Monograph of the Geometrid Moths of the U.S.)* **10**: 201, 277. An incorrect subsequent spelling.
- Sciagraphia* Hulst, 1896, *Transactions of the American entomological Society* **23**: 321, 329. Type species: *Macaria granitata* Guenée, [1858], in Boisduval & Guenée, *Histoire naturelle des Insectes (Species général des Lépidoptères)* **10**: 85, by original designation. [U.S.A.]: Pennsylvania.
- Speranza* Curtis, 1828, *British Entomology* **5**: 225. Type species: *Speranza sylvaria* Curtis, 1828, *ibidem* **5**: 225, by original designation. Scotland: Loch Rannoch, Black Wood. *G. sylvaria* is a junior subjective synonym of *Geometra brunneata* Thunberg, 1784, *Dissertatio Entomologiae sistens Insecta Suecica* (1): 9.
- Symphera* Hulst, 1896, nec Förster, 1868, *Transactions of the American entomological Society* **23**: 320, 338. Type species: *Halia tripunctaria* Packard, 1873, by original designation. A junior homonym of *Symphera* Förster, 1868, *Verhandlungen des naturkundlichen Vereins des preussischen Rheinlandes* **25**: 196 (Hymenoptera), and a junior objective synonym of *Elpista* Gumpenberg, 1887.
- Thamnonoma* Lederer, 1853, *Verhandlungen des zoologisch-botanischen Vereins zu Wien* **3** (Abh.): 179, 227, 232. Proposed as an objective replacement name for *Halia* Duponchel. *Thamnonoma* is a junior objective synonym of *Grammatophora* Stephens, 1829.
- Thamnonoma* Lederer; Staudinger & Rebel, 1901: 352.
- Xenoecista* Warren, 1897, *Novitates zoologicae* **4**: 484. Type species: *Xenoecista subdversa* Warren, 1897, *ibidem* **4**: 485, by original designation. [Colombia]: Bogota.
- GENERAL APPEARANCE (Fig. 166). Medium-sized or, rarely, small macariines (fw length 9–16 mm). Fore wings falcate with a subapical notch in termen in *M. liturata* and related taxa; more rounded in Nearctic species of the *Speranza*-group. Hind wings usually with M3 projecting to form a short 'tail' or, more rarely, rounded. Wing pattern fairly simple, fore wings with basal, median and postmedian lines, hind wings with median and postmedian lines only; in most species lines not very conspicuous. Forewings often with well-developed costal macula and interneural spots. Underside pattern generally similar. Head: chaetosemata transversely elongated. Antennae of ♂ bipectinate (many Nearctic species) or weakly serrated (many Palaearctic taxa, including the type species). Frons convex, bearing a tuft of scales but lacking specialized sclerotizations present in some species-groups of *Chiasmia* (see below). Labial palpi stout and ascending, between 1.2 and 1.5 times diameter of eyes. Proboscis well developed. Legs: hind tibia of ♂ not modified.
- VENATION (from type species). Fore wing: Sc connected with R<sub>1+2</sub> through short bar; R<sub>3–5</sub> stalked and from before upper angle of cell; Cu with prominent process; fovea well developed. Hind wing: Sc+R<sub>1</sub> and R<sub>s</sub> touching for a short distance but not anastomosing; 2A present but weak and not reaching end of cell.
- MALE GENITALIA (Fig. 587). Uncus elongated; horns present, sometimes weak but usually well developed; subapical sclerite absent; setae in two small patches

subapically. Gnathos with prominent triangular, medial element; lateral arms fairly weak. Valva: costa and sacculus well developed, not widely separated and division angled rather than excavated; sacculus typically rounded; valvula absent or present. Posterior margin of A8 cleft, not excavated, ventrally (Scoble & Krüger, *in press*).

**FEMALE GENITALIA** (Fig. 816). Papillae anales small to medium-sized, elliptical, setose. Apophyses slender, rod-like; a. anteriores approximately two-thirds length of a. posteriores. Sterigma, if developed, mostly plain, crescentic. Antrum well developed, although smaller than in many *Chiasmia* species, cylindrical to shell-shaped; an operculum may be present. Bursa copulatrix mostly elongated, pyriform, with a stellate signum.

**DISTRIBUTION.** Widely distributed in the Palaearctic and particularly the Nearctic region, with few species penetrating the Neotropical and Oriental Regions (Hua & Scoble, *in prep.*; Holloway, 1994; Scoble & Krüger, *in prep.*). There is only one species in the Palaearctic part of Africa, and none occurs south of the Sahara.

**REMARKS.** *Macaria* in its new, wide concept (Scoble & Krüger, *in prep.*) is distinguished from *Chiasmia*, another species-rich genus with uncus 'horns', mainly by the absence of a subapical sclerite of the uncus and the cleft condition of sternum A8 in the male.

## Description of species

### 1. *Macaria wauaria africana* (Zerny, 1934), comb. n.

Figs 166; 587, 816.

*Itame wauaria africana* Zerny, 1934: 52. Syntypes: 17♂, 7♀, **Morocco**: Tachdirt, 2300–2700 m, Juli (NHMW, BMNH, MAKB) [3♂ examined, only BMNH specimen cited]. Syntype ♂, **Morocco**: Paratype; H. Atlas Maroc., Tachdirt, 2300–2700 m, 3.–25.VII.[19]33 (Schwingenschuss); Brit. Mus. 1962–360.; *Itame wauaria africana* Zerny paratype male; BMNH Geometridae genitalia slide No. 19982 (BMNH) [examined]. As Zerny did not designate a type in his description, the present specimen is assumed to represent a syntype.

*Larentia carolata* Lucas, 1938: 182. Holotype ♂, **Morocco**: Ifrane, juillet 1936 [not examined] (MNHN). As Lucas's description fits the material before me well, I follow Rungs's (1981) synonymy.

*Itame wauaria africana* Zerny, 1936: 92; Wehrli, 1940: 397; Toulgoët, 1966: 203; Rungs, 1981: 263. *Larentia carolata* Lucas; Rungs, 1981: 263 (synonymy).

FORE WING LENGTH. 14–15 mm (♂).

**ADULT** (Fig. 166). Antennae of ♂ bipectinate with short rami; of female, filiform. Forewings very weakly falcate only; hind wings with a very short tail. Ground colour of wings pale cream, suffused and irrorated with grey; suffusion stronger on forewings. Forewings with basal and postmedian lines obsolete and median also not completely developed; however, position of all lines indicated by a conspicuous black bar on costa; bar of median line relatively the longest. Subapical macula prominent, black-brown; interneural spots absent. Discal spots present but small and inconspicuous. Hind wings lacking markings besides discal spots. Cilia on both wings indistinctly chequered, with chequering clearer on forewings. Underside similar, with upperside markings showing through faintly. Vestiture of body and appendages greyish, mixed with darker scales. Hind tibia of ♂ not modified.

**MALE GENITALIA** (Fig. 587). Uncus triangular to dome-shaped, appearing somewhat swollen medially; horns very small. Gnathos with broad arms, narrowing strongly towards medial element. Genital capsule broadly angular; saccus broadly rounded. Valvae with narrow, recurved costa and broadly triangular sacculus lacking specialized sclerotizations. Juxta not well defined, rounded. Aedeagus small, cylindrical along anterior two-thirds, then gently tapering; vesica bearing a single not very well sclerotized, scobinate subapical cornutus.

**FEMALE GENITALIA** (Fig. 816). Overall impression elongated. Papillae anales slender, sparsely setose. Apophyses thin, with spatulate tips; a. anteriores about two-thirds length of a. posteriores. Antrum small, somewhat hexagonal. Ductus bursae narrow, abruptly widening into the large and rounded corpus. The stellate signum large, round.

**DIAGNOSIS.** Within the study area, the species is sufficiently characterized by its wing pattern. *ssp. africana* is said to differ from the nominotypical form, *inter alia*, by having indistinct markings and the bar at the end of the forewing cell straight, not hooked; the subapical streak is stated not to narrow towards the costa. However, I consider this taxon probably not to represent more than a local race.

**BIOLOGY.** The African subspecies of *Macaria wauaria* is confined to the mountains of the Middle and High Atlas; adults have been observed from June to August. The larva feeds on *Ribes grossularia atlanticum* Ball. (Zerny, 1936; Rungs, 1981).

**DISTRIBUTION.** Morocco and Algeria.

**MATERIAL.** 8♂ and 2♀. 2 London (BMNH), 8 Bonn (MAKB).

**LOCALITIES.** **Morocco:** Tachdirt, 2300–2700 m (3); Moyen Atlas, region de Timhadit (6). **?Patria:** Sidi M'guid (1).

## 7. Genus *CHIASMIA* Hübner, [1823]

*Chiasmia* Hübner, [1823], *Verzeichnis bekannter Schmettlinge* [sic]: 295. Type species: *Phalaena clathrata* Linnaeus, 1758, *Systema Naturae* (Edn. 10) 1: 524, by subsequent designation by Grote, 1902, *Allgemeine Zeitschrift für Entomologie* 7: 472 (Fletcher, 1979).

*Chiasmia* Hübner; Wehrli in Seitz, 1940: 389; Forster & Wohlfahrt, 1981: 224.

‡*Chiasma*; Prout in Seitz, 1915: 404. An incorrect subsequent spelling of *Chiasmia* Hübner.

‡*Chiannia*; Stephens, 1835, *Illustrations of British Entomology* (Haustellata) 4: 413. An incorrect subsequent spelling of *Chiasmia* Hübner.

SYNONYMY (bibliographical information after Fletcher, 1979):

Notes: (i) Janse (1932) included *Macaria* Curtis, *Godonela* Boisduval, *Osteodes* Guenée, *Discalma* Meyrick and *Peridela* Warren as synonyms of *Semiothisa* Hübner. As he erroneously cited *liturata* Clerck as the type species of *Semiothisa*, it is clear that he understood these names to be congeneric with *Macaria* [as indicated below]. (ii) The genera *Acadra* Herrich-Schäffer, *Allochrosis* Strand, *Automolodes* Warren, *Evarzia* Walker, *Gubaria* Moore, *Iulocera* Warren and *Thyridesia* Wehrli were synonymized with *Godonela* Boisduval in a recent publication by Holloway ([1994]). As I treat *Godonela* as a junior synonym of *Chiasmia* Hübner, these genera appear below as synonyms of *Chiasmia* as well.)

*Pharmacis* Hübner, [1823], *Verzeichnis bekannter Schmettlinge* [sic]: 298. Type species: *Geometra aestimaria* Hübner, [1809], by subsequent designation by Butler, 1882, *Transactions of the Entomological Society of London* 1882: 372, nom. praeocc. (Fletcher, 1979).

*Srenia* Duponchel, 1829 in Godart & Duponchel, *Histoire naturelle des Lépidoptères, Papillons Français* 7(2): 112; 1830, *ibidem* 8 (1): 519. Type species: *Phalaena clathrata* Linnaeus, 1758, by original designation. A junior objective synonym of *Chiasmia* Hübner, [1823].

*Hercyna* Stephens, 1829 [June], *The Nomenclature of British Insects*: 45. Type species: *Phalaena clathrata* Linnaeus, 1758, *Systema Naturae* (Edn. 10) 1: 522, by subsequent designation by Fletcher, 1979, *Generic Names of Moths of the World* 3: 41. A junior homonym of *Hercyna* Treitschke, 1828, in Ochsenheimer, Schmett. Eur. 6(2): 318 (Lep., Pyralidae) and a junior objective synonym of *Chiasmia* Hübner, [1823]. See also Fletcher (1979). *Arte* Stephens, 1829 [July], *Systematic Catalogue of British Insects* (2): 373. Type species: *Phalaena clathrata* Linnaeus, 1758, *Systema Naturae* (Edn. 10) 1: 522, by subsequent designation by Fletcher,

1979, *Generic Names of Moths of the World* 3: 41 (for *Hercyna* Stephens, 1829). *Arte* was proposed as the objective replacement name for *Hercyna* Stephens, 1829, a junior objective synonym of *Chiasmia* Hübner, [1823].

*Godonela* Boisduval, 1840, *Genera et Index methodicus europaeorum Lepidopterorum*: 186. Type species: *Geometra aestimaria* Hübner, 1809 [1796], *Sammlung europäischer Schmetterlinge* 5: pl. 64, Fig. 333, by monotypy (Fletcher, 1979). *Syn. n.*

*Godonela* Boisduval; Holloway, [1994]: 162.

*Semiothisa* (*Godonela*) Boisduval; Wehrli in Seitz, 1940: 389.

‡*Gonodella*; Desmarest, 1857, in Chenu, *Encyclopédie et Histoire naturelle (Papillons nocturnes)*: 147. An incorrect subsequent spelling.

‡*Gonodela*; Moore, [1887] 1884–7, *Lepidoptera of Ceylon* 3: 467. An incorrect subsequent spelling.

‡*Sternia*; Kolenati, 1846, *Meletemata entomologica* 5: 107. An incorrect subsequent spelling of *Srenia* Duponchel, 1829.

*Acadra* Herrich-Schäffer, [1854] 1850–58, *Sammlung neuer oder wenig bekannter aussereuropäischer Schmetterlinge* 1(1): wrapper, pl.39, Fig. 197; [1856], *ibidem* 1: 28, 41. Type species: *Acadra rectistriaria* Herrich-Schäffer, [1854], *ibidem* 1(1): wrapper, pl.39, Fig.197, by monotypy.

*Osteodes* Guenée, [1858], in Boisduval & Guenée, *Histoire naturelle des Insectes (Species général des Lépidoptères)* 10: 177. Type species: *Osteodes procidata* Guenée, [1858], *ibidem*, 10: 177, by subsequent designation by Turner, 1917, *Proceedings of the Linnean Society of New South Wales* 42: 368. Nom. praeocc. A junior homonym of *Osteodes* Conrad, 1855, *Proceedings of the Academy of natural Sciences of Philadelphia* 7: 263 (Mollusca). There is no objective replacement name, but the type species is congeneric with *Chiasmia* Hübner (not with *Semiothisa* as stated by Fletcher), the latter therefore being available as a replacement name.

*Osteodes* Guenée; Walker, 1862: 1060; Meyrick, 1891: 589; Prout in Seitz, 1915: 406; Prout, 1932: 484; Janse, 1932: 204 (as junior synonym of *Semiothisa*); Wehrli in Seitz, 1940: 655.

*Evarzia* Walker, 1860, *List of the Specimens of lepidopterous Insects in the Collection of the British Museum* 20: 273. Type species: *Evarzia ozararia* Walker, 1860, *ibidem* 20: 274, by subsequent designation by Fletcher, 1979, *Generic Names of Moths of the World* 3: 87.

*Gubaria* Moore, [1887] 1884–7, *Lepidoptera of Ceylon* 3: 464. Type species: *Semiothisa fasciosaria* Hübner, [1823] 1816, *Verzeichnis bekannter Schmettlinge* [sic]: 298 (but included and cited as *fasciata* Fabricius, see Fletcher, 1979), by original designation.

*Discalma* Meyrick, 1891, *Proceedings of the Linnean*

*Society of New South Wales* (2) **6**: 585 (key), 590. Type species: *Tephrina normata* Walker, 1861, *List of the Specimens of lepidopterous Insects in the Collection of the British Museum* **23**: 966, by monotypy. In Fletcher, 1979, the date of publication is given erroneously as 1892.

*Discalma* Meyrick; Janse, 1932: 204 (as junior synonym of *Semiothisa*).

*Automolodes* Warren, 1894, *Novitates zoologicae* **1**: 411. Type species: *Bociraza vacuna* Druce, 1888, *Proceedings of the Zoological Society of London* **1888**: 576, pl.29, Fig.7, by original designation.

*Tephrinopsis* Warren, 1896, *Novitates zoologicae* **3**: 412. Type species: *Aspilates parallelaria* Walker, [1863], *List of the Specimens of lepidopterous Insects in the Collection of the British Museum* **26**: 1680, by original designation. *A. parallelaria* is a junior subjective synonym of *Tephrena normata* Walker, *ibidem* **23**: 966.

*Peridela* Warren, 1897, *Novitates zoologicae* **4**: 110. Type species: *Peridela crassata* Warren, *ibidem* **4**: 110, by original designation.

*Peridela* Warren; Janse, 1932: 204 (as junior synonym of *Semiothisa*).

*Hyostomodes* Warren, 1897, *Novitates zoologicae* **4**: 252. Type species: *Hyostomodes nubilata* Warren, 1897, *ibidem*: 252, by original designation. Listed as a junior synonym by Scoble (1999).

*Hyostomodes* Warren; Janse, 1932: 203.

*Iulocera* Warren, 1905, *Novitates zoologicae* **12**: 434. Type species: *Azata variegata* Warren, 1896, *Novitates Zoologicae* **3**: 302, by original designation.

*Allochrosis* Strand, 1912, *Archiv für Naturgeschichte* **78** (A1): 70. Type species: *Allochrosis suriens* Strand, 1912, *ibidem* **78** (A1): 70, by original designation.

*Thyridesia* Wehrli, 1940, in Seitz, *Die Gross-Schmetterlinge der Erde* **4** (Suppl.): 385. Type species: *Phalaena phaviata* Fabricius, 1798, *Eumetamorpha systematica* (Suppl.): 456, by original designation. *Thyridesia* was originally proposed as a subgenus of *Semiothisa* Hübner, 1818.

**GENERAL APPEARANCE** (Figs 167–496). Small to rather large macariines (fore wing length 7–19 mm), exhibiting great phenotypical plasticity. Apex of fore wing rounded or pointed; termen with or without emargination. Hind wing rounded, crenulated or tailed; in the latter case the tail mostly short, arising from M3. Wing pattern simple to rather complicated, but always retraceable to basic pattern of basal, median, and (frequently angled) postmedian line. In addition to lines and discal spots, interneural and preapical spots frequently present (e.g., Fig. 250). Head: antennae of ♂ ciliate or bipectinate, more rarely serrate; antennae of ♀ ciliate. Frons of ♂ smooth, slightly bulging or bearing a cone-, disk- or horseshoe-shaped prominence. Labial

palpi gently ascending, porrect, or slightly drooping; pointed, with small terminal segment; 1.5–2 times diameter of eyes. Proboscis well developed. Legs: slender; hind tibia of ♂ occasionally swollen or dilated and bearing hair-pencil. Third abdominal segment of many species with a transverse comb of setae.

**VENATION** (Fig. 18). As in *Isturgia* Hübner subject to some variation. Fore wing: Sc free or more or less briefly anastomosing with R<sub>1+2</sub>; R<sub>3–5</sub> stalked and from shortly before upper angle of cell; Cu<sub>A1</sub> arising near M<sub>3</sub>, Cu<sub>A2</sub> from about two-thirds of cell; 1A and 2A free for a short distance near base. Hind wing: Sc+R<sub>1</sub> and Rs approximated for a short distance near base but not anastomosing; Cu as on fore wing; 2A usually weak and only rarely extending beyond end of cell.

Variation of this pattern concerns mostly the arrangement of Sc and Rs in the fore wing. The fore wing of all species studied has a mostly well developed fovea.

**MALE GENITALIA** (Figs 588–743). Uncus dome-shaped, mostly indented apically and bearing an elliptical subuncus sclerite (incomplete in some members of the *featheri* group); rarely triangular and pointed. In two members of the *puerilis* group uncus evenly setose, with an enlarged pair of setae present midventrally; otherwise bearing a pair of small to large, well-sclerotized horns; rarely three or four horns developed. Gnathos cingulate in *C. puerilis*, otherwise deeply emarginate, with thin arms and small medial element. Valves showing considerable differences in shape between species-groups. Costa spatulate, without or with one or two pairs of ventral processes; sacculus rounded, triangular, square or truncated, and usually with well-defined, localized sclerotizations. Saccus in most species broadly rounded and not far protruding but occasionally produced into prominent tip. Aedeagus greatly varying in size and armament of the vesica. Octavals present, very variable in size and shape.

**FEMALE GENITALIA** (Figs 817–965). Papillae anales normally developed throughout the group, i.e. not particularly elongated or otherwise modified for oviposition. Apophyses slender; in most species, a. anteriores about two-thirds length of a. posteriores. Development of sterigma ranging from not modified over small and simple to large with intricate structure. Antrum varying greatly in size and shape between species-groups but usually well developed. Bursa copulatrix equally variable but mostly pear-shaped or more or less elongated; ductus bursae usually ribbed; wall of corpus bursae membranous or, rarely, covered with very small denticles. Bulla seminalis almost always absent. In a few species ductus bursae coiled, extending posteriorly beyond antrum. A stellate signum present in most species; rarely signum secondarily reduced.

**DISTRIBUTION.** The distribution of *Chiasmia* in the sense of this study includes the Holarctic, Afrotropical and Oriental regions, as well as the northern part of the Neotropics. *Chiasmia s. str.* is confined to the Holarctic, while many of the Afrotropical and Oriental species are morphologically closer to the type species of *Godonela* Boisduval. See also section on delimitation of genera above.

### Key to species-groups and species of uncertain group affinity

- 1 Small moths (fw length 7–15 mm); uncus bearing midventrally enlarged setae only or at most weakly developed horns, the latter frequently folded downwards (Figs 588–602; 738). ♀ genitalia, where known, as in Figs 817–830; 961 ..... 2
- Mostly larger moths (fw length 9–19 mm); uncus horns well developed, erect ..... 6
- 2(1) Uncus dome-shaped, broadly rounded apically (Fig. 738). ♀ genitalia (Fig. 961) with cylindrical antrum. Moths conspicuously marked with two black fasciae across wings (Fig. 483) ..... 164. *C. anguifera* (Prout), p. 266
- Uncus trapezoidal with slightly indented apex (e.g., Fig. 592). ♀ genitalia with different antrum. Moths not marked as above ..... 3
- 3(2) Small macariines. ♂ genitalia (Figs 588–593) with straight, fairly stout costa; sacculus produced into short process in some species; in two species uncus bearing midventrally enlarged setae only (Figs 588, 589). Aedeagus wedge-shaped; octavals small. ♀ genitalia (Figs 817–821) with pear-shaped bursa and fairly well developed antrum; signum present. Moths drab, with rounded wings (Figs 167–176). East Africa (Somalia to Tanzania) ..... 1. *featheri*-group, p. 125
- Larger macariines. ♂ and ♀ genitalia not as in Figs 588–593 and 817–821. Throughout study area ..... 4
- 4(3) Barely medium-sized macariines. ♂ genitalia (Figs 594–597) with straight, apically dilated costa bearing ventral process; sacculus small. Aedeagus small, attenuated; octavals deeply excised. ♀ genitalia (Figs 822, 823) with small pear-shaped bursa and small antrum; signum present. Moths with gently ‘tailed’ hind wings (Figs 177–182) (4 species) ..... 2. *tecnium*-group, p. 129
- Mostly larger macariines (Figs 183–192). ♂ and ♀ genitalia not as in Figs 594–597 and 822, 823. Termen of hind wing ‘tailed’ or rounded ..... 5
- 5(4) Adults (Figs 183–185) lacking process on frons. ♂ genitalia (Figs 598, 599) with long uncus horns; costa with ventral process or forming spatula; sacculus square or rounded. Aedeagus small, fusiform, lacking cornuti; octavals broad. ♀ genitalia (Figs 824, 825) with ductus bursae not or hardly extending beyond antrum. 2 species, Ethiopia to Tanzania ..... 3. *trinotata*-group, p. 132
- Adults (Figs 186–192) with process on frons. ♂ genitalia, where known (Figs 600–602), with short and stout uncus horns; costa and sacculus similar. Aedeagus small, fusiform; vesica with median cornutus. Octavals narrow. ♀ genitalia (Figs 826–830) with ductus bursae extending posteriorly beyond antrum. 5 species, mostly in southern Africa but extending to Kenya and Somalia ..... 4. *nubilata*-group, p. 133
- 6(1) ♂ genitalia with costa of valve spatulate (Figs 603–641, but excluding *C. trinotata*, Fig. 599). ♀ genitalia of various types (Figs 831–866) ..... 7
- ♂ genitalia with costa of valve variously shaped but not spatulate. ♀ genitalia not as in above figures ..... 9
- 7(6) Small to large, grey or black-and-white macariines (Figs 193–222). ♂ genitalia (Figs 603–617) with short, stout and somewhat curved costa; aedeagus thin, cylindrical, vesica lacking cornuti. ♀ genitalia (Figs 831–843) with small bursa copulatrix; signum small, with very short spicula. 16 species of mostly afromontane distribution ..... 5. *semitecta*-group, p. 137
- Adults small to large but usually not marked in grey or black-and-white (Figs 223–271). ♂ and ♀ genitalia not as in Figs 603–617 and 831–843. Distribution mostly not afromontane ..... 8
- 8(7) ♂ genitalia with massive valve, spatula rounded (Figs 618–620); sacculus strongly rounded, with an s-shaped sclerotized band. ♀ genitalia with hypertrophied antrum; sterigma, where known, modified to form a pair of large, horn-like processes (Figs 844, 845). Moths with rounded hind wings (Figs 223–227). 3 afromontane species with disjunct distribution ..... 6. *infabricata*-group, p. 149
- ♂ genitalia (Figs 621–641) with slender spatula and narrower sacculus; sclerotizations on sacculus small and confined to termen. ♀ genitalia (Figs 846–866) with medium-sized, shell-shaped antrum; sterigma smaller. Moths with tailed hind wings (Figs 228–271). 21 species, widely distributed in Afrotropical region ..... 7. *trirecurva*-group, p. 151
- 9(6) Underside of hind wing with *amarata*-pattern (e.g., Fig. 273) ..... 10
- Underside of hind wing with different pattern ..... 12
- 10(9) Fore wing narrow, termen of hind wing

- crenulated (Figs 356–367). ♂ genitalia (Figs 678–683) with long, straight costa bearing a short ventral process. ♀ genitalia (Figs 899–903) with membranous part of ductus extending beyond the long and frequently fluted antrum. 6 species, widely distributed in Afrotropical region ..... 10. *crassilembaria*-group, p. 201
- Fore wing mostly broader; if narrow, then termen of hind wing not crenulated (Figs 272–355). ♂ and ♀ genitalia not as in Figs 678–683 and 899–903. Throughout study area ..... 11
- 11(10) ♂ genitalia (Figs 642–658); costa straight, with or without ventral process; sacculus squarish to rounded, occasionally drawn into curved process. Octavals shallow, tips frequently forming rounded, sclerotized knobs. ♀ genitalia (Figs 867–883) with small to medium-sized, shell-shaped antrum. Sterigma present but small. Moths mostly with tailed hind wings (Figs 272–313). 19 species, widely distributed in study area ..... 8. *amarata*-group, p. 169
- ♂ genitalia (Figs 659–677): costa straight, in only one species with ventral process (Fig. 677); sacculus angular, drawn into curved process (rudimentary in 96. *C. fitzgeraldi*, Fig. 677) or large and broadly triangular (Figs 663–669). Octavals very large, furcate. ♀ genitalia with antrum strongly developed (Figs 884–898). Sterigma and signum prominent or absent. Moths with tailed hind wings (Figs 314–355, except *C. fitzgeraldi*, Fig. 354). 19 species, widely distributed but absent from southern Africa ..... 9. *aestimaria*-group, p. 184
- 12(9) Underside of hind wing orange, speckled with white (e.g., Fig. 369) or uniform dark greyish-brown (104. *C. lindemannae*). ♂ genitalia as in Figs 684, 685, 741; ♀ genitalia as in Figs 904–906, 964 ..... 13
- Underside of hind wing not as above. ♂ and ♀ genitalia not as in Figs 684, 685, 741 and 904–906, 964 ..... 14
- 13(12) Fairly small (fw length 14–17 mm), dirtyish ochreous species with clearly tailed hind wings (Figs 491–494). ♂ genitalia (Fig. 741) with short costa, bearing a long ventral process and apex of sacculus produced into short process. ♀ genitalia as in Fig. 964. Afromontane, most records from Ruwenzori Massive ..... 167. *C. gylura* (Prout), p. 268
- Larger (fw length 13–19 mm), ochreous to brown species with rounded hind wings (Figs 368–372). ♂ genitalia (Figs 684, 685), where known, with longer costa, lacking ventral process and with sacculus truncated or rounded. ♀ genitalia (Figs 904–906) strongly elongated, with shell-shaped antrum; signum present. Afromontane, variously distributed from Kenya to eastern Zimbabwe ..... 11. *contaminata*-group, p. 207
- 14(12) Hind wing clearly tailed ..... 15
- Hind wing crenulated or rounded ..... 17
- 15(14) Small, yellowish to yellowish brown moths (Fig. 495). ♂ genitalia (Fig. 742) with very long and curved ventral process on costa and deeply cleft aedeagus. ♀ genitalia as in Fig. 965, with semi-circular operculum 1 ..... 168. *C. nana* (Warren), p. 268
- Moths not marked as above (373–395). ♂ genitalia without or with shorter ventral process on costa (686–693). ♀ genitalia without or with smaller operculum (907–914) ..... 16
- 16(15) ♂ genitalia (Figs 686–691) with straight to gently curved costa, in most species somewhat dilated ventrally, and a narrow, rather acutely pointed sacculus. Aedeagus of most species with a single, short median cornutus. Octavals very short and knob-like to moderately large and furcate. ♀ genitalia (Figs 907–911) pear-shaped to elongated, with a narrow, cone-shaped operculum. 6 species (Figs 373–387), widely distributed in Afrotropical region ..... 12. *simplicilinea*-group, p. 209
- ♂ genitalia (Figs 692, 693), where known, with costa bent below apex, and strongly developed, rounded sacculus. Aedeagus with an external, simple or double sclerotized prong, but vesica lacking cornuti. Octavals prominent. ♀ genitalia (Figs 912–914) with elaborate sterigma, with or without operculum. 3 species (Figs 388–395), widely distributed in Afrotropical region ..... 13. *rectistriaria*-group, p. 215
- 17(14) Large, reddish-brown to ochreous moths with termen of fore wings emarginate (Figs 487–490). ♂ genitalia (Fig. 740): costa with short ventral process; octavals very shallow but well sclerotized. ♀ genitalia (Fig. 963) with large, elliptical signum and somewhat swollen antrum. Malawi to Tanzania ..... 166. *C. getula* Wallengren, p. 267
- Moths differently marked or, if reddish-brown, then termen of fore wing not emarginate. ♂ and ♀ genitalia not as in Figs 740, 963. Throughout study area ..... 18
- 18(17) Moths with chocolate-brown wings with fine whitish maculation; termen of hind wing strongly crenulated (Fig. 497). ♂ unknown. ♀ genitalia (Fig. 967) strongly elongated, with simple antrum and partly reduced signum. Madagascar .... 'Semiothisa' *peyrierasi* Viette, p. 271
- Moths not marked as above. ♀ genitalia, where known, not as in Fig. 967. Throughout study area, but absent from Madagascar with exception of *Chiasmia normata* (Fig. 496) ..... 19
- 19(18) Moths with bark-like wing pattern (Figs 396–407), or blackish, with white median fascia (Fig. 408) ..... 20

- Moths with different wing pattern ..... 21
- 20(19) Adults as in Figs 403–408. ♂ genitalia (Figs 697–699) with small, pointed sacculus and extended saccus; aedeagus very long. Octavals weakly developed, not bearing fringe of hairs. ♀ genitalia (Figs 918–920) with long, cylindrical antrum and strongly coiled ductus bursae. 3 species, widely distributed .....  
..... 15. *curvifascia*-group, p. 222
- Adults as in Figs 396–402. ♂ genitalia (Figs 694–696) with baton-shaped, truncated sacculus and short, broadly rounded saccus; aedeagus less elongated than above. Octavals of two species with short, dense fringe of hairs. ♀ genitalia (Figs 915–917) with elongated, somewhat funnel-shaped antrum; ductus bursae not coiled. 3 species, mostly southern Africa .....  
..... 14. *multistrigata*-group, p. 218
- 21(19) ♂ with clearly bipectinate antennae (also some species in *procidata*-group (couplet 25), but then adults straw-coloured with dark terminal shade (e.g., Fig. 409). Male genitalia as in Figs 732, 737, 739. Female genitalia as in Figs 955, 960, 962 ..... 22
- ♂ with ciliate, serrated or shortly bipectinate antennae. Male genitalia as in Figs 700–736, 743. Female genitalia as in Figs 921–959, 966 ..... 24
- 22(21) Large, broad-winged moths (fw length 15–18 mm) (Figs 473–475). ♂ genitalia (Fig. 732) with uncus horns minute and elongated valvae; costa with long ventral process. Aedeagus with dorsal sclerotization and a single, door-handle shaped cornutus on vesica. ♀ genitalia (Fig. 955) with strongly developed antrum. KwaZulu-Natal to Kenya, mostly coastal .....  
..... 158. *C. umbratilis* (Butler), p. 260
- Medium-sized moths with narrower wings (Figs 482, 484–486). ♂ (Figs 737, 739) and ♀ (Figs 960, 962) genitalia not as above. Widely distributed ..... 23
- 23(22) ♂ genitalia (Fig. 737): costa very narrow, with a short, pointed ventral process arising near connection with sacculus, which is drawn into fairly long process. ♀ genitalia with extensive sterigma and tube-like bursa copulatrix (Fig. 960). Adults as in Fig. 482. South Africa .....  
..... 163. *C. abnormata*, p. 265
- ♂ genitalia (Fig. 739): costa wider, with a fairly long, rounded ventral process near middle; sacculus rounded. ♀ genitalia (Fig. 962) with small sterigma and less elongated corpus bursae; antrum swollen. Adult as in Figs 484–486. South Africa; rare in Zimbabwe .....  
..... 165. *C. arenosa* (Butler), p. 266
- 24(21) Medium-sized moths, straw-coloured, with broad terminal shade (Figs 409–420) or pale ochreous, greyish or green with pattern as in Figs 421–427. ♂ genitalia (Figs 700–708) with characteristic, curved and acutely pointed aedeagus. ♀ genitalia variable (Figs 921–929) ..... 25
- Moths with similar wing shape but never straw-coloured with terminal shade or marked as in Figs 421–427. ♂ and ♀ genitalia not as in Figs 700–708 and 921–929 ..... 26
- 25(24) Small to medium-sized moths with rounded hind wings (Figs 421–427). ♂ genitalia (Figs 705–708) with uncus of normal trapezoidal shape; costa lacking ventral process; sacculus in two species produced into beak-like process (but see *observata*-group, below). ♀ genitalia (Figs 926–929) variable, with a tendency to reduction of the signum. 4 species, mostly southern Africa .....  
..... 17. *furcata*-group, p. 231
- Moths with characteristically straw-coloured wings and mostly well developed dark terminal shade (Figs 409–420). ♂ (Figs 700–704) and ♀ (Figs 921–925) genitalia rather heterogenous. 5 species, widely distributed in eastern part of study area ..... 16. *procidata*-group, p. 225
- 26(24) Moths yellowish-ochre with prominent black streaks (Figs 428, 429). ♂ genitalia (Figs 709, 710) with straight, massive costa, lacking ventral process. Sacculus forming short, beak-like process (see *furcata*-group, above). Octavals strongly developed, with rounded tips. ♀ genitalia (Figs 930, 931) with hypertrophied antrum; signum very small. 2 species, one endemic to Cape Province, the other continuously distributed from South Africa to Ethiopia .....  
..... 18. *observata*-group, p. 236
- Moths differently coloured or, if yellowish-ochre, then lacking black streaks. ♂ and ♀ genitalia not as in Figs 709, 710 and 930, 931. Widely distributed on African mainland ..... 27
- 27(26) Moths fairly small, ochreous, with almost straight postmedian line (Fig. 496). ♂ genitalia (Fig. 743) with very deeply excised octavals. ♀ genitalia (Fig. 966) elongated, as illustrated. Widely distributed in Old World tropics, including Australia ..... 169. *C. normata* (Walker), p. 269
- Moths differently coloured or, if ochreous, then not exhibiting fine and straight postmedian line (Figs 430–481). ♂ and ♀ genitalia not as in Figs 743, 966. Widely distributed on African mainland ..... 28
- 28(27) ♂ genitalia (Figs 711–715, 733–736) with base of saccus somewhat concave (not well developed in 138. *C. dentilineata*, Fig. 714). ♀ genitalia as in Figs 932–938, 956–959 ..... 29
- ♂ genitalia (Figs 716–732) with base of sacculus well rounded. ♀ genitalia as in Figs 940–955 ..... 30
- 29(28) ♂ genitalia, where known (Figs 711–715): costa

of valve with one or two pairs of ventral processes. ♀ genitalia (Figs 932–939) with short, cylindrical, wide-mouthed antrum. 8 greyish to ochreous species, southern and eastern Africa (Figs 430–442) ..... 19. *kirbyi*-group, p. 238

♂ genitalia (Figs 733–736): ventral process of costa short and stout to forming leaf-like ornamentation. ♀ genitalia variable (Figs 956–959), with or without signum. Three whitish species, southern and eastern Africa (Figs 476–480); one greyish-green to reddish species of uncertain placement, confined to southern Africa (Fig. 481) ..... 22. *marmorata*-group, p. 261

30(28) Medium-sized moths (fw length 12–16 mm), with uniform wing-pattern (Figs 443–464). ♂ genitalia (Figs 716–724) with slender costa, bearing a single, pointed ventral process; aedeagus without sclerotized dorsal area. ♀ genitalia (Figs 940–950) with rather small, shell-shaped antrum and rounded, walnut-shaped sterigma; signum present. 11 species, distributed mostly in savanna throughout the region .....  
..... 20. *brongusaria*-group, p. 244

Fairly small to large moths (fw length 12–18 mm); habitus similar to *brongusaria*-group (Figs 465–475). ♂ genitalia (Figs 725–732) with stout costa, bearing blunt ventral process; aedeagus stout, with characteristic dorsal sclerotization. ♀ genitalia, where known (Figs 951–955), with large antrum and sterigma, not shaped as above; signum reduced. 6 species, distributed in savanna throughout the study area (including 158. *umbratilis*, couplet 22); 1 species Palaearctic (Morocco) .....  
..... 21. *olindaria*-group, p. 255

## Descriptions of species

### 1. *Chiasmia featheri*-group

The *featheri*-group comprises seven very small to small species of pale ochreous, whitish, or greyish coloration. The species here included are noteworthy as they show the transition between the plesiomorphic and apomorphic states in the development of the gnathos (cingulate to deeply emarginate) and uncus (evenly setose to horned). Apart from the small size of the adult, apomorphies which define the group are the shape of the valve in the male genitalia, as well as the very small, pointed octavals.

Distribution of the group is limited to north-eastern and eastern Africa from Somalia, Ethiopia and the Sudan to Tanzania.

**MALE GENITALIA** (Figs 588–593). Uncus arising from broad base, horns small, pointing inwards; gnathos delicate. Gnathos cingulate (*C. puerilis*) or deeply emarginate with slender arms. Valves appearing short

and massive; costa straight or very faintly recurved, ventral process absent. Sacculus large, between rounded and square in shape; its termen produced into a short, truncated process. Aedeagus wedge-shaped or somewhat fusiform; vesica bearing one or two median cornuti of differing shape, or a group of small apical cornuti. Octavals very small but well sclerotized, rather w-shaped.

**FEMALE GENITALIA** (Figs 817–821). Papillae anales not large, rounded; apophyses thin. Sterigma: I. antevaginalis, if developed, crescent-shaped; I. postvaginalis, if developed, forming circular, creased areas some distance from ostium. Operculum mostly present; antrum short and stout. Bursa copulatrix more or less pear-shaped; in *C. puerilis* ductus bursae very short. Signum present, somewhat irregular in shape and situated near middle of, or close to, base of corpus bursae.

## Key to species

- 1 ♂ genitalia with uncus bearing a pair of enlarged setae midventrally; true horns absent (Figs 588, 589). ♀ genitalia as in Figs 817, 818. Somalia, Ethiopia ..... 2
- ♂ genitalia with uncus 'horns', often folded against ventral surface (Figs 590–593). ♀ genitalia, where known, not as above (Figs 819–821). Ethiopia to Tanzania ..... 3
- 2(1) Very small (fw length 7 mm), whitish-grey (♂) to pale ochreous (♀) moths (Figs 169, 170), sexually dimorphic: ♂ lacking interneural maculae, in ♀ interneural maculae present, concentrated in well-demarcated patch. ♂ genitalia (Fig. 589) with aedeagus exhibiting conspicuous, serrated apical cornutus. ♀ genitalia (Fig. 818) stout, with large bursa copulatrix and very short ductus ..... 2. *puerilis* (Prout), p. 126
- Slightly larger (fw length 9–10 mm), ochreous-grey moths (Figs 167, 168), not sexually dimorphic and lacking interneural maculae. ♂ genitalia (Fig. 588) with aedeagus lacking such a cornutus. ♀ genitalia (Fig. 817) elongated, with very small antrum .... 1. *calvifrons* (Prout), p. 126
- 3(1) Moths with conspicuous dark interneural maculae (Fig. 171), covering substantial part of postmedian area, not well demarcated. ♂ genitalia (Fig. 590) with triangular sacculus and strongly wedge-shaped aedeagus. ♀ genitalia (Fig. 819) pear-shaped, rather elongated. Kenya ..... 3. *featheri* (Prout), p. 127
- Moths with or without interneural spots (Figs 172–176), but lacking larger maculae ..... 4
- 4(3) Adults pale, whitish-grey (Fig. 176). ♂ genitalia (Fig. 593): aedeagus with single, door handle-shaped aedeagus; octavals rounded. ♀ unknown. Tanzania ..... 6. *dodoma* sp. n., p. 129

- Adults somewhat darker, ochreous (Figs 172–175). ♂ genitalia (Figs 591, 592) not as above. ♀ genitalia as in Figs 820, 821. East Africa, two species recorded from Tanzania ..... 5
- 5(4) ♂ genitalia (Fig. 591) with very short, square sacculus; aedeagus with apical row of microcornuti. ♀ genitalia (Fig. 820) pyriform, with strongly rounded corpus bursae. Sudan, Kenya, Tanzania ..... 4. *zelota* (Prout), p. 127
- ♂ genitalia (Fig. 592) with sacculus more elongated; aedeagus with two cornuti (one door handle-shaped, one rod-like). ♀ genitalia (Fig. 821) like a gradually widening tube. Sudan and Ethiopia to Kenya and Tanzania . 5. *ate* (Prout), p. 128

### 1. *Chiasmia calvifrons* (Prout, 1916) comb. n.

Figs 167, 168; 588, 817

*Discalma calvifrons* Prout, 1916b: 158. Holotype ♂, [Somalia]: Somaliland, Mandera, 24 October 1908 (OMU) [not examined]. See Remarks. Paratypes (1♂, 5♀). [Somalia]: 1♂, Sept[ember] 28 1908, Somaliland, Mandera, 47 m SW. of Berbera, 3000 ft., Open & bush, Pres[ented] 1913 W. Feather; Mandera Sep. 28/08 [handwritten]; Co-Type *Discalma calvifrons* Prout, t[ype] in B.M. [ex errore?], L.B. Prout 1914–15; L.B. Prout Coll. B.M. 1939–643; genitalia slide No. 16932 (BMNH); 5♀, *ibidem*, but undated [examined] (BMNH). See Remarks.

*Hyostomodes calvifrons* (Prout); Wiltshire, 1982: 282.

FORE WING LENGTH. 9 mm (♂), 9–10 mm (♀).

ADULT (Figs 167, 168). Very small. Antennae of ♂ densely ciliate, of ♀, simple. Ground colour of wings chalk white, irrorated with brownish grey, postmedian area more or less completely suffused. Basal and median lines largely absent, postmedian a little better developed, but also faint. Discal spots dark and rather conspicuous. Interneurals present but weakly developed. Underside very similar, markings slightly fainter in some examples. Thorax and abdomen whitish grey, interspersed with some darker scales. Hind tibia of ♂ dilated, bearing hair-pencil.

MALE GENITALIA (Fig. 588). Uncus broad, enlarged setae inconspicuous; gnathos deeply emarginate, rather well sclerotized. Contour of tegumen squarish. Costa of valve straight, somewhat dilated apically, lacking process. Sacculus narrow, about twice width of costa, pointed. Aedeagus short and wedge-shaped, vesica without cornuti. Octavals proper absent, but central portion of distal margin of A8 weakly sclerotized.

FEMALE GENITALIA (Fig. 817). Papillae anales small and rounded. Apophyses relatively short and stout, a.

anteriores less than half length of a. posteriores. Sterigma not modified. Antrum very small. Bursa copulatrix with ductus gradually widening into corpus, its wall finely ribbed throughout. Signum round, of medium size.

DIAGNOSIS. A rather variable species and most similar to the small taxa of the *Chiasmia featheri*-group, notably 5. *C. ate* and 4. *C. zelota*. The differences in genitalic structure can at once be seen from the illustrations.

BIOLOGY. A dry savanna species; recorded altitudinal range is from 300–1000 m. Adults have been observed in January, April and November.

DISTRIBUTION. Somalia.

MATERIAL. 13 ♀ (1 dissected, Geometridae genitalia slide No. 16949 (BMNH). 13 London (BMNH).

LOCALITIES. [Somalia]: Somaliland, 10°N 44°30'E, 2200 ft (10); *ibidem*, 10°15'N 45°10'E, 1000 ft (2); *ibidem*, 10°10'N 45°45'E, 1500 ft (1).

REMARKS. (i) The holotype of *calvifrons* was not examined. As the paratypes examined are from the same type locality and were collected at the same time as the holotype I am satisfied as to the identity of the species. (ii) According to Prout's original description, there should be 5♂ and 7♀ paratypes. Not all of these could be traced as some were apparently not labelled as 'co-types'.

### 2. *Chiasmia puerilis* (Prout, 1916) comb. n.

Figs 169, 170; 589, 818

*Discalma puerilis* Prout, 1916b: 157. Holotype ♂, [Somalia]: Somaliland, Mandera, 47 m [iles] SW. of Berbera, 3000 f[ee]t, Open & bush, Feb[ruary] 14 1910, Pres[ented] 1913 [by] W. Feather; Mandera, Feb[ruary] 14/[19]10 [handwritten]; *Discalma puerilis* Prout ♂ type; Type ♂ t in BM., L.B. Prout 1914–15; Fig. 15 pl.II ♂; Type ♂ Prout, P.Z.S. 1916, p.157, Pl.II, Fig.15, ♂; Type LEP: No 2544 *Discalma puerilis* Prout, Hope Dept. Oxford (OMU); genitalia slide UMO 1994/1548 [examined].

FORE WING LENGTH. 7–8 mm (♂); 9–10 mm (♀).

ADULT (Figs 169, 170). Sexually dimorphic. ♂: very small; termen of hind wing rounded. Wings chalky white with very pale greyish-brown markings. All three lines on fore wing present, but very faint; only basal line discernible on hind wing. Discal spots present but also weak. A fine white line running along termen of both wings between postmedian line and termen. Underside whitish with fine greyish dusting; white postmedian line well developed. ♀: small. Termen of

fore wing very faintly emarginate below apex; hind wing showing trace of a short tail. Ground colour of wings whitish, densely dusted with ochreous grey, particularly in postmedian area. All three lines very faint. Three small dark maculae present where lines meet costa. Discal spots well developed, larger on fore wing. A very conspicuous group of blackish interneurals present on fore wing postmedian and a smaller, paler group below anal angle on hind wing. Markings and coloration of underside similar, but interneurals greyish-brown rather than black.

**MALE GENITALIA** (Fig. 589). Uncus broadly triangular, horns very small, pointing inwards. Gnathos cingulate. Tegumen square. Valves short and stout. Costa nearly straight, without process. Sacculus rectangular, apex forming a short, recurved point. Aedeagus short, wedge-shaped; a prominent row of five cornuti in anterior half. Octavals absent.

**FEMALE GENITALIA** (Fig. 818). Papillae anales of normal size, rounded. Apophyses short and rather stout; a. anteriores less than half length of a. posteriores. Sterigma (l. antevaginalis) plain, crescentic. Operculum present. Antrum short and wide. Bursa copulatrix elliptical, with very short ductus beyond antrum. Signum irregularly shaped and rather small, situated near centre of corpus.

**DIAGNOSIS.** *Chiasmia puerilis* is the smallest African macariine. The ♂ is similar to *C. calvifrons*, above, but separated by the striking arrangement of cornuti (the aedeagus in *calvifrons* is unarmed). The ♀ is easily recognized by a group of clearly defined interneurals in the postmedian area of the fore wing; a fainter such group is also present on hind wing. Interneurals are similarly developed only in *C. featheri* below, where they are less well defined.

**BIOLOGY.** The species appears to be associated with rather arid savanna, interspersed with open areas. Adults have been collected from February to May.

**DISTRIBUTION.** Somalia, Ethiopia.

**MATERIAL.** 1♂ (dissected, MZF genitalia slide M. Krüger No. 5) and 16♀ (2 dissected, Geometridae genitalia slide No. 16940 (BMNH); MZF genitalia slide M. Krüger No. 6). 6 London (BMNH), 12 Florence (MZF).

**LOCALITIES.** [Ethiopia]: Haro-Gobana, Gurra (1); Daroli, Arussi Galla (1), Karo-Lola, S[outh] of Dana R[iver] (1); Darassam R[iver], Gurra (2); Kata, Mane R[iver] (1). **Somalia:** Afgoi (12).

### 3. *Chiasmia featheri* (Prout, 1922) comb. n.

Figs 171; 590, 819

*Hyostomodes featheri* Prout, 1922b: 359. LECTOTYPE ♂, here designated, [Kenya]: (B[ritish] E[ast] A[frica]), Kibwezi, 28. Nov[ember] 1918 (W. Feather); *Hyostomodes featheri* Prout ♂ type; Rothschild Bequest B.M. 1939-1 (BMNH) [examined]. Paralectotypes (1♂, 25♀). [Kenya]: ibidem, with various collection dates (1♂ and 1♀ dissected, Geometridae genitalia slides No. 16933, 16934) (BMNH) [examined].

**FORE WING LENGTH.** 9 mm (♂), 9-10 mm (♀).

**ADULT** (Fig. 171). Small. Antennae of ♂ shortly bipectinate, with stout rami; of ♀, simple. ♀ with broader wings and more strongly developed interneurals. Ground colour of wings whitish, suffused with light greyish-brown to brown and with some darker dusting. Suffusion darker in postmedian area. All three lines present, angled below costa of fore wing and in some specimens marked by rows of small blackish maculae. Discal spots present, dark. Interneurals prominently developed on fore wing, particularly in ♀. Underside slightly more whitish, discal spots and interneurals shining through. Postmedian area with a broad, darker greyish-brown fascia. Lines very faint to absent. Body concolorous with wings. No setal comb on A3. Hind tibia lost in examined males.

**MALE GENITALIA** (Fig. 590). Uncus horns rather long and thin; gnathos normal. Costa of valve straight and hardly dilated apically, without process. Sacculus about twice width of costa, bluntly pointed and lacking sclerotizations. Aedeagus short and stout, apex distinctly pointed. A single elliptical cornutus present in apical half. Octavals small and arcuate, with strongly sclerotized tips.

**FEMALE GENITALIA** (Fig. 819). Papillae anales small and rounded. Both pairs of apophyses thin, a. anteriores three-fourths length of a. posteriores. Sterigma not particularly modified. Operculum narrow. Antrum short and rather massive. Bursa copulatrix large, pear-shaped; ductus bursae ribbed, corpus entirely membranous. Signum large, slightly elliptical.

**DIAGNOSIS.** Easily separated from 4. *C. zelota* and 5. *ate* by the strongly developed, blackish interneurals. These are also prominent in ♀ of 2. *C. puerilis*, below, but this species is of much lighter build. The differences in the female genitalia can be seen from the illustrations.

**BIOLOGY.** Adults have been observed in November.

**DISTRIBUTION.** Kenya.

**MATERIAL.** 1♀. 1 Nairobi (NMKE).

**LOCALITIES.** **Kenya:** Olorgasailie, Kajiado (1).

### 4. *Chiasmia zelota* (Prout, 1922) comb. n.

Figs 172-174; 591, 820

*Hyostomodes zelota* Prout, 1922b: 360. Holotype ♂, [Kenya]: (British East Africa), Kibwezi, 12. Dec[ember] 1916 (W. Feather); *Hyostomodes zelota* Prout ♂ type; Rothschild Bequest B.M. 1939-1 (BMNH) [examined]. Paratypes (1♂, 9♀). [Kenya]: *ibidem*, with various collection dates (1♂ examined; Geometridae genitalia slide No. 16926) (BMNH). *Hyostomodes zelota* Prout; Prout, 1932a: 495; Fletcher, 1978a: 82.

FORE WING LENGTH. 10 mm (♂), 12 mm (♀).

ADULT (Figs 172-174). Small. Antennae of ♂ strongly serrated, of ♀, simple. Ground colour of wings cream white to pale ochre, suffused to a varying degree with greyish-brown and irrorated with grey. Postmedian area usually darker or at least displaying a broad dark fascia. Lines mostly indistinct, postmedian relatively best developed but frequently also reduced. Interneurals fairly well developed, particularly in ♂. Discal spots present but not very conspicuous. Underside similar, but ground colour frequently more yellowish and dark irroration coarser. Postmedian area with a broad, grey-brown fascia. Body concolorous with wings; abdomen dorsally with some pairs of small dark spots. Setal comb on A3 weak. Hind tibia of ♂ dilated, bearing hair-pencil on inner side.

MALE GENITALIA (Fig. 591). Uncus horns drooping, well developed; gnathos normal. Costa of valve virtually straight, not dilated apically and lacking processes. Sacculus large, with drooping appearance; termen extended to form a conspicuous curved process. Aedeagus cylindrical; vesica with an apical group of microcornuti. Octavals very small and furcate, well sclerotized.

FEMALE GENITALIA (Fig. 820). Papillae anales small and elliptical. Apophyses moderately stout and rather short, a. anteriores about two-thirds length of a. posteriores. Sterigma plain, as in figure. Operculum small, semicircular. Antrum short, broadly funnel-shaped. Bursa copulatrix pear-shaped and membranous except for ribbed posterior portion of ductus. Signum rather small, circular.

DIAGNOSIS. The species resembles 5. *C. ate*, below. Adults of *C. zelota* are on average slightly larger, with darker and better developed markings, most noticeably the interneurals. In the male genitalia, *zelota* is characterized by longer processes of the sacculus and differences in the shape of the juxta (cf. figures). In the female, the best diagnostic character is offered by the operculum, which is rounded and semicircular in *zelota* and more massive and tectiform in *ate*.

BIOLOGY. Presumably a savanna species. Adults have been collected in March-April and December.

DISTRIBUTION. Sudan, Kenya and Tanzania.

MATERIAL. 1♂ and 6♀ (2 dissected, Geometridae

genitalia slide No. 16948 (BMNH); genitalia slide No. 44 (NMKE)). 5 London (BMNH), 2 Nairobi (NMKE).

LOCALITIES. [Sudan]: White Nile, lat. 15°11' (1), *ibidem*, lat. 12° (1), Karidjhalu, Mane R. (1). Kenya: Olorgasailie, Kajiado (1), (BEA), Masongoleni, 2900 ft (1), Kibwezi (1). [Tanzania]: Tanganyika, Iringa (1).

### 5. *Chiasmia ate* (Prout, 1926) comb. n.

Figs 175; 592, 821

*Hyostomodes ate* Prout, 1926a: 14. Holotype ♀, Sudan: Typus; Sudan, Nilen, Pr. W. Exp. Gyld.; *Hyostomodes ate* Prout ♀ type; Renk 29.8.[19]21 [handwritten on large piece of paper]; genitalia slide M. Krüger No. 1 (NRS) [examined]. Paratypes (4♀). Sudan: 3♀, same data as holotype (1 dissected, Geometridae genitalia slide No. 16947 (BMNH)) 1♀, Fashy [sic] Shoya, 30.8.[19]21 (NRS, BMNH) [examined].

*Hyostomodes ate* Prout; Prout, 1932a: 495.

FORE WING LENGTH. 11 mm (both sexes).

ADULT (Fig. 175). Very much like *C. zelota*, above, but paler, with fainter markings and coarser irroration. For a description, see under that species. Setal comb on A3 absent. Hind tibia of ♂ dilated, bearing hair pencil.

MALE GENITALIA (Fig. 592). Uncus horns well developed but short, folded against uncus; gnathos fairly delicate. Costa of valve straight and hardly dilated apically, without ventral processes. Sacculus large, drooping, its outer margin drawn into a fairly long process. Aedeagus short and spindle-shaped. Vesica with a single, small cornutus of characteristic shape near tip. Octavals small and inconspicuous, well sclerotized.

FEMALE GENITALIA (Fig. 821). Papillae anales small and rounded. Apophyses moderately stout; a. anteriores about half length of a. posteriores. Sterigma (l. antevaginalis) forming circular, poorly defined sclerotizations. Operculum prominent, roof-shaped. Antrum short, broadly funnel-shaped. Bursa copulatrix pear-shaped with fairly long ductus. Wall of ductus ribbed, of corpus, membranous. Signum well developed.

DIAGNOSIS. Very similar to 4. *C. zelota*, above, with which it occurs sympatrically in several localities, but usually separable from that species by its lesser size and particularly its fainter markings and coarser irroration. Examination of the genitalia may be necessary, and the species are best separated by differences in length of the sacculus and the shape of the juxta (cf. figures). The female genitalia of *ate* are less pear-shaped than in

*zelota* and are characterized by a more prominent, tectiform operculum.

**BIOLOGY.** *Chiasmia ate* is probably associated with fairly dry savanna. Adults have been collected in March, August and November.

**DISTRIBUTION.** Northern and eastern subsaharan Africa, from the Sudan and Ethiopia to Kenya and Tanzania.

**MATERIAL.** 6♂ (2 dissected, genitalia slide No. 17 (NMKE); Geometridae genitalia slide No. 16925) (BMNH) and 9♀ (2 dissected, genitalia slides No. 40, 41 (NMKE), 9 London (BMNH), 6 Nairobi (NMKE).

**LOCALITIES.** [Tanzania]: (Tanganyika Territory), Olduvai Gorge (1). [Kenya]: Kibwezi (1), Lake Baringo (2), Olorgasailie, Kajiado (3). **Sudan:** Renk (1), White Nile, lat. 11–12° (1); *ibidem*, lat. 12° (4); S., Mongalla Prov. (1). **Ethiopia:** Diredaua, NW. Harar (1).

## 6. *Chiasmia dodoma* sp. n.

Figs 176; 593

**TYPE MATERIAL.** Holotype ♂, [Tanzania]: Dodoma, Tanganyika, 50 m[iles] South, 12.III.1950 (N. Mitton) (TM). Paratypes (5♂). [Tanzania]: same data as holotype (2 dissected, TM Lep. Het. genitalia slides No. 11245, 11261) (TM).

**FORE WING LENGTH.** 8–11 mm (♂).

**ADULT ♂** (Fig. 176). Small. Termen of hind wing rounded. Wings cream white to pale ochre, irregularly peppered with grey, particularly along costa of fore wing and in postmedian area. Lines variously developed but mostly incomplete. Discal spots and two pairs of interneurals present but faint in some specimens. Ground colour on underside more yellowish; markings similar. Thorax and body ochreous to yellowish, speckled with grey. Hind tibia of ♂ dilated, bearing hair pencil. Seta comb on A3 absent.

**MALE GENITALIA** (Fig. 593). Very similar to genitalia of *C. ate* and *zelota*, but smaller relative to size of moth. Gnathos large. Process of sacculus truncated; inner margin of sacculus demarcated by well-defined sclerotized line. Aedeagus somewhat spindle-shaped; vesica bearing a small, doorhandle-shaped apical cornutus with approximately six spines. Octavals short and shallow.

**DIAGNOSIS.** Similar to 5. *C. ate* and 4. *C. zelota*, above, but paler. Reliable identification requires dissection of the genitalia. *C. dodoma* is best separated from above species by the differences in the structure of the octavals and the sacculus (see illustrations).

**BIOLOGY.** Probably a savanna species. The type series was collected in March.

**DISTRIBUTION.** Central Tanzania.

**ETYMOLOGY.** Named after the type locality.

## 2. *Chiasmia tecnium*-group

The *tecnium*-group comprises four small and inconspicuous species in which a short 'tail' may be present on the hind wing. Members are widely distributed in the Afrotropical region, including Madagascar; one species is endemic to Saudi Arabia. Autapomorphies defining the group include (i) a relatively long, apically widening costa of the valve; (ii) a small, strongly attenuated aedeagus, (iii) large, arcuate and deeply emarginate octavals in the male and (iv) a simple, small antrum capped by a small operculum in the female.

**MALE GENITALIA** (Figs 594–597). Uncus horns small but well sclerotized; gnathos slender. Valves large in relation to rest of genitalia: costa massive, dilated apically, bearing a short ventral process; sacculus rather inconspicuous, somewhat angular and less than twice width of costa. Aedeagus small, wedge- or spindle-shaped; vesica bearing a weakly chitinized median cornutus and occasionally showing some striations. Octavals arcuate.

**FEMALE GENITALIA** (Figs 822, 823). Papillae anales narrow and pointed; apophyses relatively robust. Sterigma not modified. Operculum present; antrum small and inconspicuous. Bursa copulatrix pyriform; wall of ductus ribbed; signum present.

## Key to species

- 1 Adult (Fig. 181) greyish white, recalling *Sterrhinae* in habitus. ♂ genitalia (Fig. 596) with costa of valve not very strongly dilated; aedeagus angular, acutely pointed; vesica with a single, slightly curved median cornutus. ♀ genitalia (Fig. 823) pear-shaped, with small operculum. Saudi Arabia ..... 9. *frontosa* (Wiltshire), p. 131
- Adults more ochreous brown, with different habitus (Figs 177–180, 182). ♂ (Figs 594, 595, 597) and ♀ genitalia (Fig. 822), where known, not as above. African mainland and Madagascar ..... 2
- 2(1) Adult (Fig. 182) with strongly developed, dark postmedian line. ♂ genitalia (Fig. 597) with comparatively slender costa. ♀ unknown. Madagascar ..... 10. *banian* (Viette), p. 131
- Adults (Figs 177–180) usually with much weaker postmedian line (but cf. Fig. 178). ♂ genitalia (Figs 594, 595) with more massive costa. ♀ genitalia, where known, as in Fig. 822. African mainland ..... 3
- 3(2) Adult as in Fig. 180. ♂ genitalia (Fig. 595) with apically cleft aedeagus and a curved median cornutus on vesica. ♀ unknown. Zaire ..... 8. *monopepla* (Prout), p. 130

- Adult variable (Figs 177–179). ♂ genitalia (Fig. 594) with aedeagus not cleft apically; vesica with a single thin needle-like cornutus and some small microcornuti below apex. ♀ genitalia (Fig. 822) pear-shaped, slender, with well developed signum. Southern Africa, reaching Tanzania in the north ..... 7. *tecnium* Prout, p. 130

### 7. *Chiasmia tecnium* (Prout, 1916) comb. n.

Figs 177–179; 594, 822; 986

*Macaria tecnium* Prout, 1916a: 175. Holotype ♂, [South Africa, Gauteng]: Pretoria, 3. Dec[ember]

[19]13 (A.J.T. Janse); Genitalia slide No.] 1399;

*Macaria tecnium* Prout Type No. 2211; *Macaria tecnium* Prout ♂ type (TM) [examined].

*Macaria tecnium* Prout; Janse, 1917: 113.

*Semiothisa tecnium* (Prout); Janse, 1932: 232.

*Hyostomodes ignava* Prout, 1928b: 28. Holotype ♂, [Moçambique]: Typus; Phuza, 27.XI.1907;

*Hyostomodes ignava* Prout ♂ type; Muséum Genève 2419 (MHNG) [examined]. **Syn. n.**

FORE WING LENGTH. 10–12 mm (both sexes).

ADULT (Figs 177–179). Small, apex of fore wing pointed, termen of hind wing angled at about 120°. Variable in coloration, ground colour ochreous, suffused with grey, greyish-brown or brown and dusted with grey. Postmedian area in most specimens darker. Basal and median line absent to rather well developed; postmedian line mostly faint, but in some examples strongly developed. Discal spots faint or absent. Frequently some blackish spots present along postmedian line on both wings. Underside similar, slightly paler. Vestiture of thorax and body ochreous grey. Hind tibia of ♂ dilated. Setal comb on A3 present. Variation: this is a rather variable species, especially as regards presence or absence of dark maculation in postmedian area of wings and development of lines on upperside of wings.

MALE GENITALIA (Fig. 594). Uncus horns small and curved; gnathos rather delicate. Costa of valve straight, widening towards apex. A single short process arising near connection with the small and squarish sacculus. Angle between costa and sacculus approximately 90°. Aedeagus small and acutely pointed; vesica with some apical striations and bearing a long, thin cornutus. Octavals relatively large, arcuate.

FEMALE GENITALIA (Fig. 822). Papillae anales pointed. Apophyses moderately strong, a. posteriores about twice length of a. anteriores. Sterigma not modified. Operculum present; antrum very small. Bursa copulatrix pear-shaped; ductus gently ribbed posteriorly, corpus membranous. Signum well developed.

DIAGNOSIS. A rather variable species, particularly as

regards development of the postmedian. Occasionally (Fig. 179) the postmedian area is much darker and suffused with purple; these specimens can look radically different from typical examples. However, the small size and pointed fore wing apex are typical and confusion should only occur with 10. *C. banian* (endemic to Madagascar) and 8. *C. monopepla*, so far only recorded from Zaire. The differences in male genitalia structure can be seen from the illustrations.

BIOLOGY. This species is extremely reluctant to oviposit in captivity (*pers. obs.*). *Chiasmia tecnium* prefers savanna habitats of moderate aridity, although there are a number of records from the KwaZulu-Natal coast. Adults have been collected in February–March and again from September–November.

DISTRIBUTION (Fig. 986). Largely restricted to southern Africa, with most records from Transvaal and KwaZulu-Natal provinces in South Africa; rarer in Zimbabwe. Also recorded from Botswana, Moçambique, Malawi and the Caprivi strip in northern Namibia, reaching its northernmost point of distribution in Tanzania.

MATERIAL. 19♂ (3 dissected, TM genitalia slides No. 10970, 11113; genitalia slide L 662 (NMBZ)) and 66♀ (6 dissected, TM genitalia slides No. 10971, 10973, 11114–16, 11271). 6 London (BMNH), 2 Berlin (ZMHB), 44 Pretoria (TM), 17 Bulawayo (NMBZ), 12 N.J. Duke collection, 3 H.S. Staude collection.

LOCALITIES. **South Africa, Transvaal:** [Gauteng]: Pretoria (3), Buffelspoort, Magaliesberg (1), [North-West]: Rustenburg (1), Gloster Game Reserve (1), Pilanesberg National Park (2). [Northern Province]: Pietersburg (1), Thabazimbi (1), Mabula Lodge W. Nylstroom (1), Mmabolela Estate (4), D'Nyala Game Reserve (4), Farm Rochdale 700, Soutpansberg District (1). [Mpumalanga]: Skukuza (10), Pongola River (6), Pullen Farm, 28 km SE. Nelspruit (5). **Free State:** Sasolburg (1). **KwaZulu-Natal:** Mhlosinga, Hlabisa District (2), M'bawana Forest, Ubombo District (1), Imbazwane, Zululand (1), Durban (1), Umhlanga Rocks (1), St. Lucia Lake (1), Jozini Dam (1). **Botswana:** Palapye Road (1). **Namibia:** Katima Mulilo, E. Caprivi (2). **Zimbabwe:** Mazvikadei Dam, Banket (10), Harare (Salisbury) (3), Khami, Matabeleland (9), Doddieburn Ranch (3), Devuli River (1), Reata Ranch, 6 m NE. Tod's Hotel (1), Bindura (1). **Malawi:** Chipeta Village, Karanga (3). **Tanzania:** Morogoro (1). **Moçambique:** Makulane (1).

### 8. *Chiasmia monopepla* (Prout, 1934) comb. n.

Figs 180; 595

*Hyostomodes monopepla* Prout, 1934b: 92. Holotype

$\delta$ . [Zaire]: Type; Musée du Congo, Katanga: Mato, 27.I.1926 (Ch. Seydel); R. Dét. B. 2762; *Hyostomodes monopepla* Prout  $\delta$  type; Coll. Muséum Tervuren, *Hyostomodes monopepla* Prout Holotype; genitalia slide M. Krüger No. 16 (MRAC) [examined].

FORE WING LENGTH. 11 mm ( $\delta$  holotype).

ADULT  $\delta$  (Fig. 180). Small. Termen of hind wing rounded. Antennae strong, ciliate; ciliae equalling diameter of shaft or shorter. Frontal cone present. Ground colour of wings whitish, suffused with brownish grey and additional grey irroration, very slightly more heavily so in postmedian area. All three lines faint, median relatively most prominent. Three small dark maculae present where lines meet costa of fore wing. Discal spots dark, larger on hind wing. Underside similar but paler and somewhat glossy, with markings on upperside shining through. Vestiture of thorax and abdomen greyish. Hind tibia of holotype lost. Setal comb on A3 present.

MALE GENITALIA (Fig. 595). Very similar to *C. tecnum*, above. Aedeagus larger and more heavily sclerotized, in particular apical region, and bearing a curved, slender median cornutus on vesica. Octavals as in preceding species.

DIAGNOSIS. Very similar to 7. *C. tecnum*, above. Reliable identification requires dissection of the genitalia. While these are also quite similar, the aedeagus is much larger and better sclerotized in *C. monopepla*. Distributional data may also be helpful as *C. tecnum* has not so far been recorded from central Africa.

BIOLOGY. The holotype was collected in January.

DISTRIBUTION. So far only known from Katanga province in Zaire.

MATERIAL. Only known from the holotype.

## 9. *Chiasmia frontosa* (Wiltshire, 1986) comb. n.

Figs 181; 596, 823

*Hyostomodes frontosa* Wiltshire, 1986: 282. Holotype  $\delta$ . [Saudi Arabia]: Harithi, 21°18'N 40°18'E, 1910 m, 28.IX.1983; Saudi Arabien (W. Büttiker); XII 73/Preparation WBL 185; *Hyostomodes frontosa* Wiltsh. holotype  $\delta$  (NMB) (accompanying genitalia preparation could not be located) [examined]. Paratypes (1 $\delta$ , 1 $\varphi$ ). Saudi Arabia: 1 $\varphi$ , Fifa, 1.IV.1983; [label in Arabic]/Coll. RAWRC ent[omological] team (A.S. Talhouk); *Hyostomodes frontosa* Wiltsh. Paratype  $\varphi$ , genitalia slide M. Krüger No. 1 (NMB). 1 $\delta$ , Wadi Tisba, 7.–8.XI.[19]85 (W. Büttiker); Geometridae genitalia slide No. 17555 (BMNH) [examined].

*Hyostomodes frontosa* Wiltshire; Wiltshire, 1990: 134.

FORE WING LENGTH. 10–11 mm ( $\delta$ ), 10 mm ( $\varphi$ ).

ADULT (Fig. 181). Small and delicate. Ground colour of wings whitish, densely peppered with grey; postmedian areas more or less wholly suffused with grey. Basal line virtually absent; median line present but indistinct, more like a fascia. Postmedian also reduced. Discal spots well developed, blackish. Underside similar, but postmedian area with some large pale blotches along termen. Vestiture of thorax and abdomen greyish-ochre. Hind tibia of  $\delta$  dilated, bearing a rather weakly developed hair-pencil. Seta comb on A3 present.

MALE GENITALIA (Fig. 596). Uncus horns small and stout; gnathos fairly delicate. Costa of valve dilated apically, bearing a short ventral process. Sacculus rounded, hardly wider than costa. Aedeagus straight, tapering anteriorly, truncated posteriorly, dorsally with a large sclerotized area. Octavals broadly rounded.

FEMALE GENITALIA (Fig. 823). Papillae anales of normal size, pointed. Apophyses strong; a. anteriores about two-thirds length of a. posteriores. Sterigma not modified. Operculum fine, semicircular. Antrum small. Bursa copulatrix pear-shaped; ductus ribbed, corpus membranous. Signum small, circular.

DIAGNOSIS. A small species rather like species of *Tephritis* (Sternorrhinae) in appearance. Confusion with other Macariini should not occur.

BIOLOGY. *Chiasmia frontosa* is adapted to arid conditions; the types examined were collected in April and October.

DISTRIBUTION. Endemic to Saudi Arabia.

MATERIAL. Only the types listed above were seen.

## 10. *Chiasmia banian* (Viette, 1981) comb. n.

Figs 182; 597

*Tephritis banian* Viette, 1981: 126. Holotype  $\delta$ , Madagascar: Holotype; Madagascar Sud-Ouest, Banian, 70 m, Ankazoabo, 13.vii.[19]57 (P. Griv[eaud]); *Tephritis banian* n.sp.  $\delta$  Holotype, P.E.L. Viette det. 1981; genitalia slide M. Krüger No. 8 (MNHN) [examined].

FORE WING LENGTH. 10 mm ( $\delta$  holotype).

ADULT  $\delta$  (Fig. 182). Small. Ground colour of wings whitish, densely irrorated and suffused with purplish brown, median area relatively palest. Basal and median lines indistinct and basal altogether absent on hind wing; postmedian very heavily developed, blackish. Discal spots present but indistinct. Underside whitish,

suffused with faint purplish-grey. Postmedian line and discal spots shining through from upperside, but otherwise markingless. Thorax and abdomen concolorous with wings. Hind tibia of ♂ dilated, bearing hair-pencil. Setal comb on A3 present.

**MALE GENITALIA** (Fig. 597). Uncus horns and gnathos rather delicate. Costa of valve straight, somewhat dilated apically; ventral process pointed, arising near connection with the somewhat angular sacculus. Juxta large, membranous. Aedeagus small and strongly tapering anteriorly, with two small, poorly defined, rod-like cornuti on vesica. Octavals broadly rounded and rather deeply cleft.

**DIAGNOSIS.** No similar species of *Chiasmia* occurs on Madagascar, although occasionally aberrant specimens of *T. C. tecnum*, above, with a very heavy postmedian line and a purplish tinge occur.

**BIOLOGY.** The vegetation at the type locality suggests a preference for arid scrub. The unique holotype was collected in July at an altitude of 70 m.

**DISTRIBUTION.** South-west Madagascar.

**MATERIAL.** Known from the male holotype only.

### 3. *Chiasmia trinotata*-group

A very small group, containing only two species. Members of the *trinotata*-group are fairly small macarines: the ochreous-grey wings are semihyaline and their underside has a mottled appearance. Distribution is confined to east Africa. The male genitalia are fairly different structurally, and the synapomorphy defining the group appears to be the presence of a broad and finely ribbed sclerotized band in the posterior half of the bursa copulatrix in the female.

**MALE GENITALIA** (Figs 598, 599). Uncus horns barely medium-sized; gnathos weak. Costa of valve virtually straight and either slender, not dilated apically and bearing ventral process or greatly widened to form a spatula. Sacculus rounded with only a faintly squarish termen; apical region with small, localized sclerotization. Aedeagus short and fusiform; vesica either plain or bearing a group of very small cornuti. Octavals shallow, furcate.

**FEMALE GENITALIA** (Figs 824, 825). Papillae anales normal; apophyses rather weak. Sterigma not modified. Antrum well developed, shell-shaped or somewhat pentagonal. Bursa copulatrix more or less strongly elongated, posterior margin appearing truncated. Ductus bursae exhibiting a characteristic, broad, sclerotized band. Signum of medium size, elliptical.

### Key to species

- 1 Moths small, with normally developed scaling (Fig. 183). ♂ genitalia (Fig. 598) with ventral process on costa. ♀ genitalia (Fig. 824) rather elongated. Ethiopia to Tanzania ..... 11. *trinotata* (Warren), p. 132
- Moths delicate, with semihyaline wings (Figs 184, 185). ♂ genitalia (Fig. 599) with spatulate costa. ♀ genitalia (Fig. 825) similar, but bursa copulatrix shorter. Ethiopia ..... 12. *trinotatula* sp. n., p. 133

### 11. *Chiasmia trinotata* (Warren, 1902) comb. n.

Figs 183; 598, 824

*Tephrinopsis trinotata* Warren, 1902: 530.  
LECTOTYPE ♂, here designated, [Kenya]: (BEA), Escarpment, Jan[uary] [19]01, 6500–9000 ft (W. Doherty); *Tephrinopsis trinotata* Warr. ♂ Type/IX.530; Type: Rothschild Bequest B.M. 1939-1 (BMNH) [examined]. Paralectotypes (2♂, 1♀). [Kenya]: same data as holotype (BMNH).

**FORE WING LENGTH.** 11–12 mm (♂), 11–13 mm (♀).

**ADULT** (Fig. 183). Small. Ground colour of wings whitish, but coloration ranging from cream white to quite dark grey due to more or less heavy dusting. Markings very weak on upperside, usually only postmedian developed for a short distance near costa of fore wing; other lines absent or very weak. Discal spots absent to moderately well developed; no further markings present. Underside in pale specimens of a uniform pale ochreous; in darker specimens, however, markings more complicated: fore wings ochreous with coarse dark dusting, a broad yellowish streak running along costa, termen dark brown. Hind wing ochreous with heavy, irregular dark brown irroration, median and postmedian lines well developed, dark. Thorax and abdomen variable in coloration, concolorous with wings. Hind tibia of ♂ not modified. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 598). Uncus horns medium-sized; gnathos normal. Costa of valve slightly curved, dilated apically, and with a single ventral process arising near connection with sacculus. Sacculus small, squarish, with small, localized sclerotizations. Aedeagus small and spindle-shaped; vesica without cornuti. Octavals prominent and extending across greater part of abdomen, broadly arcuate.

**FEMALE GENITALIA** (Fig. 824). Papillae anales medium-sized. Both pairs of apophyses slender, a. anteriores very short, about one-fourth length of a. posteriores. Sterigma not modified. Antrum shell-shaped. Bursa copulatrix tubular: ductus broad, finely ribbed, gradually widening into elongated corpus. Signum of medium size, elliptical.

**DIAGNOSIS.** Despite the range of variation in colour it displays, *C. trinotata* is not likely to be confused with any other species. There exists some similarity to pale specimens of 148. *C. inconspicua*, below, but these are always at least slightly ochreous in coloration. *C. trinotatula*, below, can be recognized by its semihyaline wings.

**BIOLOGY.** *Chiasmia trinotata* has been collected in savanna as well as forest habitats; the recorded altitudinal range is from 1500 to above 2000 m. Adults are active in January and from April to June.

**DISTRIBUTION.** East Africa, with most records coming from Kenya; further found in Tanzania, Uganda and Ethiopia.

**MATERIAL.** 35♂ (1 dissected, Geometridae genitalia slide No. 16149) (BMNH) and 31♀ (1 dissected, Geometridae genitalia slide No. 16150) (BMNH). 28 London (BMNH), 2 Munich (ZSBS), 1 Bulawayo (NMBZ), 35 Nairobi (NMKE).

**LOCALITIES.** **Tanzania:** S., Oldeani (1), Masan River (2). **Kenya:** N. Kavirondo, Maramas District, Ilala, 4500 ft (14), Lake Naivasha, 50 m W. Nairobi (1), Crescent Island, Naivasha (1), Mt. Elgon (10), Kakamega (3), Njoro (1), Nairobi (3), Nakuru (14). **S. Kakumega [sic] Forest, Jala River, 48–5300 ft (3).** **Uganda:** Madi Opei, N. Acholi (1). **Ethiopia:** SW., Djire, Djimma (1), Wallega Province, Jubdo Bir-Bir, 1900 m (1).

## 12. *Chiasmia trinotatula* sp. n.

Figs 184, 185; 599, 825

**TYPE MATERIAL.** Holotype ♂, [**Ethiopia:**] Kabaratar, 56 m[iles] S. of L[ake] Tana, 6800', 20. March 1926 (R.E. Cheeseman); Rothschild Bequest B.M.1939-1.; Geometridae genitalia slide No. 16943 (BMNH). Paratypes (1♂, 3♀). [**Ethiopia:**] 1♂, 2♀, same data as holotype, Geometridae genitalia slide No. 16944 (BMNH); 1♀, Dangila, 6700', 40 m S[outh] Lake Tana, 14.VII.[19]26 (R.E. Cheeseman); Rothschild Bequest B.M. 1939-1 (BMNH).

**FORE WING LENGTH.** 11–12 mm (♂), 12 mm (♀).

**ADULT** (Figs 184, 185). Small. Termen of hind wing crenulated. Wings cream white, glossy, somewhat hyaline. Markings greatly reduced: three small maculae present where lines meet costa; remnants of angled postmedian and of preapical spot discernible, upperside otherwise plain. Postmedian area with some ochreous dusting. Underside: basal and median area hyaline, without markings. Postmedian area yellowish-ochre, variegated with dark brown. Apex of fore wing with a wedge-shaped yellowish blotch, bordered by dark

brown. The markings are much clearer in ♀. Vestiture of thorax and abdomen ochreous with dark speckles. Hind tibia of ♂ not modified. Segment A3 lost in preparation of holotype.

**MALE GENITALIA** (Fig. 599). Uncus horns moderately large; gnathos normal. Valves short and robust. Costa forming a spatula; sacculus rounded, exhibiting small, localized sclerotizations. The small aedeagus short and stout; a small, lightly sclerotized area studded with microcornuti present near apex. Octavals furcate, rather shallow.

**FEMALE GENITALIA** (Fig. 825). Papillae anales small and rounded. Both pairs of apophyses thin; a. anteriores about two-thirds length of a. posteriores. Antrum fairly small, shell-shaped. Bursa copulatrix resembling a short and broad, gradually widening tube; its wall entirely membranous. Ductus bursae exhibiting a conspicuous, ribbed sclerotized band. Signum barely medium-sized, situated near base.

**DIAGNOSIS.** Similar to *C. trinotata*, but more delicate and characterized by its partly translucent wings and markings on the underside of the hind wings.

**BIOLOGY.** *Chiasmia trinotatula* has been collected at altitudes of 2200–2300 m. Adults are active in March and July.

**DISTRIBUTION.** Ethiopia.

**ETYMOLOGY.** *Trinotatula*, diminutive of *trinotata*: the moth resembles small specimens of *C. trinotata*.

## 4. *Chiasmia nubilata*-group

This group contains five small to medium-sized, ochreous, grey or brownish species. Distribution of two species is limited to the southwestern arid zone of southern Africa; the other three are largely confined to Zimbabwe. The monophyly of the group rests on two autapomorphies, (i) the presence of a horseshoe- or dome-shaped protuberance on the frons and (ii) the shape of the ductus bursae, which is curved and extends beyond the antrum for a short distance.

**MALE GENITALIA** (Figs 600–602). Uncus horns small; gnathos delicate. Costa of valve massive relative to remainder of genitalia, straight, and bearing a short ventral process. Sacculus inconspicuous, less than twice width of costa, its inner margin sclerotized. Aedeagus quite small, sharply pointed; vesica bearing one small median cornutus, surrounded by a group of microcornuti. Octavals comparatively shallow, w-shaped.

**FEMALE GENITALIA** (Figs 826–830). Papillae anales and apophyses normally developed. Sterigma not modi-

fied. Antrum stout. Ductus bursae conspicuously curved beyond antrum; a sclerotized and ribbed band extending from its extremity to near middle of corpus (cf. *C. curvifascia*-group, below). Corpus bursae of irregular shape; signum circular.

## Key to species

- 1 Adults with rounded fore wings (Figs 186–189) ..... 2
- Adults with pointed fore wings (Figs 190–192) ..... 3
- (2(1) Adult (Figs 186–188) variable, but usually with well developed postmedian fascia on fore wing. ♂ genitalia (Fig. 600) with diminutive uncus horns and strongly elongated valvae. ♀ genitalia (Fig. 826) with posteriormost part of ductus bursae tapering. Fairly arid parts of the Transvaal, the Free State and the Cape Province in South Africa, Namibia; Botswana ..... 13. *diarmodia* (Prout), p. 134
- Adult (Fig. 189) uniform greyish-brown. ♂ unknown. ♀ genitalia (Fig. 827) with posteriormost part of ductus bursae bulbous. Northern Botswana ..... 14. *ngami* sp. n., p. 135
- (3(1) Termen of hind- and especially forewings crenulated (Fig. 192). ♂ unknown. ♀ genitalia (Fig. 830) with ductus bursae extending posteriorly only a very short distance beyond antrum; signum small. Somalia ..... 17. *somalica* sp. n., p. 137
- Termen of wings not or only weakly crenulated (Figs 190, 191). ♀ genitalia (Fig. 828, 829) with ductus bursae posteriorly extending further beyond antrum; signum larger. Mostly southern Africa, northwards to Kenya ..... 4
- (4(3) Darker, olivaceous grey moths with clear markings (Fig. 190). ♂ genitalia (Fig. 601) without cornuti on vesica and somewhat more pointed octavals. ♀ genitalia as illustrated (Fig. 828) ..... 15. *nubilata* (Warren), p. 135
- Ochreous moths with weakly developed markings (Fig. 191). ♂ genitalia (Fig. 602) with fairly large apical cornutus on vesica and octavals broadly rounded. ♀ genitalia as illustrated (Fig. 829) ..... 16. *extrusilinea* (Prout), p. 136

### 13. *Chiasmia diarmodia* (Prout, 1925) comb. n.

Figs 186–188; 600, 826; 987

*Tephrina? diarmodia* Prout, 1925: 594. Holotype ♀, [South Africa, Northern Cape]: Upington, Cape/ (Father R. Solier) Jan[uary] 1919; *Tephrina?* *diarmodia* Prout ♀ type; *Semiothisa diarmodia* Prout, A.J.T. Janse det. (SAM) [examined].  
*Semiothisa diarmodia* (Prout); Janse, 1932: 227.

FORE WING LENGTH. 9–14 mm (♂), 9–13 mm (♀).

ADULT (Figs 186–188). Small. Ground colour of wings whitish to ochreous, suffused with grey, greyish brown or, more rarely, reddish brown and profusely irrorated with grey. Basal line usually weak; median line mostly well developed on fore wing, heavy, but frequently not reaching costa; postmedian line well developed, fine, bordered distally on fore wing by a very prominent, dark band. Discal spots small, inconspicuous. Underside ochreous, striated with greyish brown, markings indistinct. Vestiture of thorax and body dull ochreous. Hind tibia of ♂ not modified. Seta comb on A3 present. Variation: the development of the dark bands is subject to considerable variation; occasionally they are more or less obliterated. Partly melanistic examples occur not infrequently, particularly among the central Namib populations from Gobabeb. In two very striking examples from Kwaai and Chobe Rapids in Botswana (in NMBZ) the ground colour is light ochreous, striated with grey, particularly in postmedian area. While the discal spots are moderately well developed all other markings are entirely reduced.

MALE GENITALIA (Fig. 600). Uncus horns very short; gnathos medium-sized. Costa of valve elongated and slightly dilated apically; a single short process present near middle. Sacculus small, hardly wider than costa. Aedeagus somewhat fusiform with pointed apex. Vesica bearing a single, short cornutus and several microcornuti near tip. Octavals arcuate and rather shallow.

FEMALE GENITALIA (Fig. 826). Papillae anales short, rounded. Apophyses moderately stout, a. anteriores more than two-thirds length of a. posteriores. Sterigma not modified. Antrum medium-sized. Bursa copulatrix highly characteristic: ductus greatly developed, extending beyond antrum and exhibiting a strongly sclerotized band. Corpus bursae membranous, with a large circular signum.

DIAGNOSIS. *Chiasmia diarmodia* is characterized by its small size and continuous postmedian fascia. There are no similar Macariini in the study area.

BIOLOGY. The species has a clear preference for arid habitats, although it does not form part of the desert biome proper. Near the Kuiseb River at Gobabeb in the Namib desert, the larva lives probably on *Acacia albida* Delile and *A. erioloba* E. Meyer (Pamphlet of Desert Ecological Research Unit). *C. diarmodia* appears early in the season; adults have been collected from July to October.

DISTRIBUTION (Fig. 987). Southern Africa between 17° and 31°S and west of 25°E, inhabiting the drier parts of the Transvaal, the Free State and the Cape Province in South Africa. Namibia; Botswana.

**MATERIAL.** 32♂ (2 dissected, TM genitalia slides No. 2718, 10861) and 82♀ (3 dissected, TM genitalia slides No. 10862, 11117; slide L 669 (NMBZ)). 1 London (BMNH), 2 Vienna (NHW), 2 Bulawayo (NMBZ), 100 Pretoria (TM), 3 Windhoek (SMWN), 5 D.M. Kroon collection, 1 H.S. Staude collection.

**LOCALITIES.** **South Africa, Transvaal:** [North-West]: Christiana (1), Schweizer-Reneke (1). **Free State:** Oranjerivier, H.F. Verwoerd Dam (4). **Cape Province:** [Northern Cape]: Mata Mata, S. Kalahari (16), P.K. LeRoux Dam, Van der Kloof (1), Van Zylsrus, Gordonia District (1), Kuruman (3), Vryburg to Kuruman (2). **Namibia:** Gobabeb (60), Kuiseb River/Gobabeb (12), Okahandja (3), Usakos (1), Karakovisa (2), Bellerode, 27 km E. of Windhoek, 1800 m (1). **Botswana:** Twee Rivieren, Kalahari Gemsbok Park (1), Kwaai N. Maun (1), Chobe Rapids (1).

Doubtful: Skukuza (1). No further data: S[üd] Afrika (Holub) (2).

#### 14. *Chiasmia ngami* sp. n.

Figs 189; 827; 987

**TYPE MATERIAL.** Holotype ♀, **Botswana:** Thamalakane R[iver], Maun, Ngamiland; 15.XII.1968, Pinhey-Falc[on College] Exp[edition], Nat[ional] Mus[eum] Bulawayo; genitalia slide L 682 (NMBZ).

**FORE WING LENGTH.** 11 mm (♀ holotype).

**ADULT ♀** (Fig. 189). Small. Ground colour of wings whitish but extensively suffused with greyish brown. Fore wings somewhat darker than hind wings and with intense darker irroration. Discal spots present, larger on fore wings. Lines reduced, but wings with a broad, dark fascia in position of postmedian line; no further markings present. Underside similar but much lighter, pale ochreous with fine brownish striation. Discal spots and postmedian fascia shining through. Vestiture of thorax and abdomen of same colour as wings, paler on underside.

**FEMALE GENITALIA** (Fig. 827). Papillae anales normal. Apophyses posteriores very thin; a. anteriores stouter, rather more than two-thirds length of former. Sterigma not modified. Antrum short, capped by a small operculum. Bursa copulatrix with long ductus, extending beyond antrum and terminating in a bulbous extension. Inner side of ductus wall exhibiting a discrete, strongly sclerotized band. Corpus bursae small and pear-shaped, with well developed signum.

**DIAGNOSIS.** *Chiasmia ngami* is a rather inconspicuous, drab species, which bears some resemblance in facies to females of 22. *Isturgia exerraria*. There also exists some similarity to weakly marked females of *C. diarmodia*, but the differences in genitalia structure can immediately be seen from the illustrations.

**BIOLOGY.** The vegetation at the type locality consists of sparse dry savanna. The single known adult was collected in December.

**DISTRIBUTION** (Fig. 987). Known from a single locality in northern Botswana.

**ETYMOLOGY.** Named after the type locality.

#### 15. *Chiasmia nubilata* (Warren, 1897) comb. n.

Figs 190; 601, 828; 988

*Hyostomodes nubilata* Warren, 1897: 252. LECTOTYPE ♂, here designated, [Kenya]: Muani, Ukamba, 12.XI.[18]96 (Dr Ansorge); Pl.v f.ii.1897; iv.252/*Hyostomodes nubilata* Warr. ♂ Type; Type (BMNH) [examined]. Paralectotype (1♀). [Kenya]: same data as holotype (BMNH) [not examined].

*Hyostomodes nubilata* Warren; Janse, 1917: 113; 1932: 204.

**FORE WING LENGTH.** 11–13 mm (♂), 12–13 mm (♀).

**ADULT** (Fig. 190). Small, with pointed fore wings. Ground colour of wings whitish, suffused with greyish-green, particularly in postmedian area. Basal and median line mostly faint, but their position indicated by a dark macula on costa of fore wing. Postmedian line more strongly developed, especially on fore wing, and acutely angled below costa. Discal spots small and inconspicuous. Preapical spot prominent; apex whitish. Underside whitish, coarsely and irregularly striated with brown-grey. Discal spots dark, conspicuous. Postmedian area olivaceous with whitish blotches along termen and on apex of fore wing. Thorax and abdomen ochreous-grey, abdomen dorsally with a paler median line, bordered by darker spots. Hind tibia of ♂ dilated, carrying hair-pencil. Seta comb on A3 absent.

**MALE GENITALIA** (Fig. 601). Uncus horns small; gnathos delicate. Costa of valve curved, not dilated apically; ventral process acutely pointed, curved. Sacculus small, hardly wider than costa. Aedeagus club-shaped; vesica with a single cornutus and some microcornuti near apex. Octavals large, broadly arcuate.

**FEMALE GENITALIA** (Fig. 828). Papillae anales rather small. Both pairs of apophyses thin, a. anteriores about two-thirds length of a. posteriores. Sterigma broadly crescentic but with poorly defined contours. Antrum short and rather robust. Ductus bursae strongly ribbed, curved posteriorly and extending beyond antrum; corpus pear-shaped, membranous, with near-circular, medium-sized signum.

**DIAGNOSIS.** Easily recognized without examination of the genitalia by the pointed fore wings and the conspicuous marks on the costa.

**BIOLOGY.** *Chiasmia nubilata* is associated with frost-free savanna. Adults have been collected from January to March, in July and August, and from October to December. The species often occurs in the same localities as *C. extrusilinea*, below.

**DISTRIBUTION** (Fig. 988). Mainly Zimbabwe and northern parts of Transvaal province in South Africa, not occurring south of 25°S. The species reaches Tanzania and Kenya in the north, where it appears to be rare and local.

**MATERIAL.** 40♂ (2 dissected, TM genitalia slides No. 959, 10878) and 28♀ (1 dissected, TM genitalia slide No. 10879). 8 London (BMNH), 39 Pretoria (TM), 11 Bulawayo (NMBZ), 9 N.J. Duke collection, 1 H.S. Staude collection.

**LOCALITIES.** **South Africa, Transvaal:** [Northern Province]: Thabazimbi (1), Punda Milia (1), Lapalala (1). **Zimbabwe:** Umvuma (9), Hope Fountain (4), Wankie (8), Deka River, 5 m NE. Wankie (3), Kariba (1), Delawé Ranch, Matetsi (1), Selukwe (2), Bulawayo (8), Umgusa Valley 50 km N. Bulawayo (2), Harare (Salisbury) (5), Lowdale (2), Wingate (1), Hunyani River (1), Mutare (Umtali) (2), Shangani (2), Victoria Falls (2), Huntersroad (3), Marandellas (1), Sawmills (1), Devuli River, Sabi Valley (3), Sinoia (1). **Kenya:** Muani, Ukamba (1). **Tanzania:** Dodoma (1).

**REMARKS.** In the original description, the locality is given as 'Innani', whereas the label of the lectotype reads 'Muani'.

## 16. *Chiasmia extrusilinea* (Prout, 1925) comb. n.

Figs 191; 602, 829, 989

*Hyostomodes extrusilinea* Prout, 1925: 595. Holotype ♂, [Zimbabwe]: S[southern] Rhodesia, Umvuma, Rev[erend] [initials undecipherable, but supposed to be Neville] Jones; *Hyostomodes extrusilinea* Prout ♂ type; Type (SAM) [examined]. Paratypes: number not stated. Examined: 9♂, 4♀. **[Zimbabwe]:** 1♂, Rhod[esia], Umvuma, 25.XII.[19]17 (A.J.T. Janse); G[enitalia preparation] 1395; *Hyostomodes protrusilinea* [sic] Prout ♂ paratype. 8♂, 4♀, **[Zimbabwe]:** *ibidem*, without type label, dated 20.XII. (5♂, 2♀, TM wing preparation No. 1418, TM Lep. Het. genitalia slide No. 10881), 21.XII. (1♀), 23.XII. (1♂, 1♀), 25.XII. (2♂). The data labels on these specimens erroneously cite Janse as collector.

*Hyostomodes extrusilinea* Prout; Janse, 1932: 204.

**FORE WING LENGTH.** 11–13 mm (♂), 10–13 mm (♀).

**ADULT** (Fig. 191). Small, with pointed fore wings. Overall appearance pale. Ground colour of wings pale

ochreous, more or less heavily dusted with greyish-brown. Markings not well developed: discal spots very faint or absent; basal and median lines absent, postmedian line moderately well developed to wholly reduced. Postmedian area slightly darker in most specimens. Underside ochreous, with fine, slightly darker ochreous irrations; markings usually entirely reduced; in some specimens postmedian line and discal spots present. Vestiture of thorax and abdomen ochreous. Hind tibia of ♂ dilated, carrying hair-pencil. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 602). Uncus horns and gnathos fairly small. Costa of valve long and rather massive, faintly curved and bearing a single, short ventral process. Sacculus small, hardly wider than costa. Aedeagus short and fusiform, acutely pointed; vesica without cornuti. Octavals large, semicircular.

**FEMALE GENITALIA** (Fig. 829). Papillae anales long and pointed. Both pairs of apophyses rather short, notably a. anteriores. Antrum short and rather wide. Ductus bursae exhibiting a ribbed, well sclerotized band and extending for a short distance beyond antrum. Corpus bursae pear-shaped; signum medium-sized, slightly elliptical.

**DIAGNOSIS.** Characterized by its pale ochreous coloration and strong reduction of markings.

**BIOLOGY.** A savanna species which frequently shares the same habitat with *C. nubilata*, above. Adults have been collected in January, March–April, and from October to December.

**DISTRIBUTION** (Fig. 989). From southern Moçambique and the Transvaal through Zimbabwe, where it is widely distributed, to East Africa (Tanzania, Kenya, Uganda).

**MATERIAL.** 38♂ (2 dissected, TM genitalia slides No. 1395, 10880) and 20♀. 4 London (BMNH), 1 Paris (MNHN), 3 Munich (ZSBS), 8 Nairobi (NMKE), 26 Pretoria (TM), 9 Bulawayo (NMBZ), 7 N.J. Duke collection.

**LOCALITIES.** **South Africa, Transvaal:** [Mpumalanga]: Skukuza (2). **Malawi:** Zomba (2). **Zimbabwe:** Huntersroad (8), Hillside (2), Darwendale (2). Sawmills (1), 15 m SW. Lundi River Bridge (1), Mashonaland (1), Mutare (Umtali) District (7), Shangani (1), Bulawayo (4), Harare (Salisbury) (4), Sinoia (2), Christon Bank (1), Marandellas (1), Lowdale (4), Glenlivet (1). **Moçambique:** Delagoa Bay (1). **[Zambia]:** (Northern Rhodesia), Lusaka (1), Nkana (1). **Tanzania:** Mpanda, Sibwesa (2), Manjara Hotel, 1300 m (1). **Kenya:** Kamasia, 4500 ft (1), Molo River (1). **Uganda:** Acholi, Madi Opei (5), Lake Kyoga, Teso Distr. (1)

**17. *Chiasmia somalica* sp. n.**

Figs 192; 830

**TYPE MATERIAL.** Holotype ♀, Somalia: Afgoi, IV-V.1978 (Simonetta) (MZF). Paratypes (2♀). Somalia: same data as holotype (1 dissected, MZF genitalia slide M. Krüger No. 3) (MZF).

**FORE WING LENGTH.** 10–11 mm (♀).

**ADULT ♀** (Fig. 192). Small. Apex of forewings produced and somewhat falcate, termen of both pairs of wings crenulated and finely edged with blackish-brown. Ground colour of wings whitish, fairly evenly suffused with ochreous and finely striated and dusted with grey. Forewings with all three lines present, basal and postmedian line fine, complete; median line indistinct, more like a fascia. Postmedian line strongly angled below costa. Discal spots blackish, distinct. Preapical spot faint, apical area mixed with some white scales. Suffusion over postmedian area stronger, brownish; a round, dark spot present near middle of postmedian area. Hind wings with ochreous basal and median areas and pale brown postmedian area. Basal line absent, median and postmedian quite faint. Discal spots small but distinct, as on forewings. Underside similar but lines hardly discernible and postmedian area markedly darker than distal portion of wings. Vestiture of thorax and abdomen ochreous, mixed with dark scales.

**FEMALE GENITALIA** (Fig. 830). Papillae anales small, pointed. Both pairs of apophyses thin, a. anteriores about two-thirds length of a. posteriores. Sterigma narrowly crescentic. Antrum small and delicate. Ductus bursae short and curved, with a small sclerotization near connection with antrum and extending for a very short distance beyond antrum. Corpus bursae large by comparison, pear-shaped. Signum small.

**DIAGNOSIS.** Somewhat similar to *C. nubilata* above but paler and with more strongly crenulated wings. In the ♀ genitalia, the ductus bursae extends posteriorly for a shorter distance than in *nubilata* and the signum is smaller.

**BIOLOGY.** *Chiasmia somalica* occurs sympatrically with *C. puerilis*, *C. assimilis*, *C. semialbida*, *Isturgia deerraria* and *I. quadriplaga*, and probably inhabits rather arid savanna. Adults have been collected in April and May.

**DISTRIBUTION.** Somalia.

**ETYMOLOGY.** Named after its country of origin.

**5. *Chiasmia semitecta*-group**

The *C. semitecta*-group consists of 16 small and delicate to rather large and robust, mostly grey macariines (fore wing length 12–18 mm). The antennae are very

shortly bipectinate in the male and simple in the female. With the exception of a single Madagascan species, the group's distribution is largely confined to southern and eastern Africa, where most species are found in mountainous habitats. Apart from the appearance of the adults, the group is defined by several autapomorphies provided by the genitalia. In the male, these include (i) a spatulate costa; (ii) an elongated, thin aedeagus lacking cornuti, and (iii) large, more or less arcuate octavals. In the female genitalia, the group is characterized by (i) the small size of the bursa copulatrix and (ii) a small signum with very short spicula.

**MALE GENITALIA** (Figs 603–617). Uncus horns small to medium-sized; gnathos weak. Valve short and massive; costa frequently recurved and forming a spatula; apex of costa in some species truncated or trilobate. Sacculus rounded to pointed, apex and termen in most species with conspicuous chitinizations. Aedeagus small relative to size of genitalia, subcylindrical or attenuated and vesica without cornuti. Octavals variable in shape but always rather large; in some species posterior margin hairy.

**FEMALE GENITALIA** (Figs 831–843). Bursa copulatrix small relative to width of abdomen. Apophyses posteriores exhibiting small, triangular dilatations close to papillae anales in some species. Sterigma: lamella ante vaginalis usually forming a large sclerotized plate of various shape. Structure and size of antrum variable; bursa more or less pear-shaped. Signum small, with very short spicula.

**Key to species**

(Note: *C. murina*, *lunyani*, *melsetteri*, *bomfordi*, *deleta* and *pinheyi* are very similar in genitalia structure and best separated by the shape of the octavals.)

- |      |  |   |
|------|--|---|
| 1    | Very small moths (fw length 9–11 mm), marked in black and white (Fig. 210). ♂ genitalia (Fig. 611) with very short uncus horns and narrow costa; ♀ genitalia (Fig. 838) with small, elongated bursa copulatrix. Coastal, KwaZulu-Natal to Moçambique ..... | ..... 27. <i>alternata</i> (Warren), p. 144 |
| -    | Small to large grey moths (fw length 13–19 mm) (Figs 193–209, 211–222). ♂ and ♀ genitalia not as in Figs 611, 838. Southern and eastern Africa, mostly afromontane, and absent from coast. 1 species in Cameroon .....                                     | ..... 2                                     |
| 2(1) | Medium-sized moths (fw length 12–16 mm) with scarcely tailed hind wings and bold line pattern (Figs 193–197). Distribution restricted to Cape Province and adjoining parts of Free State .....   | ..... 3                                     |
| -    | Medium-sized or larger moths with different line pattern (Figs 198–209, 211–222). Distribution not confined to Cape Province .....   | ..... 4                                     |

- 3(2) Pure grey species (Figs 193–195). ♂ genitalia (Fig. 603) with broad, strongly protruding sacculus and rounded spatula; aedeagus long. ♀ genitalia as in Fig. 831 ..... 18. *semitecta* (Walker), p. 139
- Greyish-brown species (Figs 196, 197). ♂ genitalia (Fig. 604) with more slender sacculus and triangular spatula; aedeagus shorter. ♀ genitalia as in Fig. 832 .... 19. *brunnescens* sp. n., p. 139
- 4(2) Light grey moths (Figs 198–199). ♂ and ♀ genitalia as in Figs 605, 833. Transvaal, southern Mozambique and eastern parts of Zimbabwe ..... 20. *grisescens* (Prout), p. 140
- Smaller or larger grey moths (200–209; 211–222). ♂ and ♀ genitalia not as in Figs 605 and 833. Widely distributed in study area, including eastern parts of Zimbabwe ..... 5
- 5(4) Small, grey species (fw length 13–14 mm) with reduced markings (Figs 200–209). ♂ and ♀ genitalia very uniform (Figs 606–610 and 834–837). Distribution restricted to eastern Zimbabwe ..... 6
- Small to large species (fw length 11–19 mm) with well developed wing pattern (Figs 211–222). ♂ and ♀ genitalia not as in above Figs. Widely distributed in study area ..... 11
- 6(5) Moths whitish, with intense grey-brown dusting (Fig. 206). ♂ genitalia (Fig. 608) with broad octavals, tips directed outwards. Zimbabwe: Marandellas, Hunyani River ..... 24. *bomfordi* sp. n., p. 142
- Moths, if of similar size, with less intense dusting. ♂ genitalia not as in Fig. 608. Distribution may overlap ..... 7
- 7(6) Moths evenly mouse-grey, lines very fine (Figs 200, 201). ♂ genitalia (Fig. 606) with pointed costa and fairly narrow and pointed sacculus; octavals short, evenly rounded. ♀ genitalia as in Fig. 834. Zimbabwe: Vumba Mts., at low altitudes ..... 21. *murina* sp. n., p. 141
- Moths, if of similar size, usually with more prominent lines (Figs 202–205, 208–210). ♂ and ♀ genitalia not as in Figs 606, 834. Distribution may overlap ..... 8
- 8(7) Dirtyish brown-grey moths with indistinct but fairly heavy postmedian (Figs 202–205). ♂ genitalia, where known, as in Fig. 607; ♀ genitalia as in Figs 835, 836 ..... 9
- Moths, if of similar size, with less prominent postmedian line (Figs 207–209). ♂ genitalia as in Figs 609, 610; ♀ genitalia, where known, as in Fig. 837 ..... 10
- 9(8) Adult as in Figs 202, 203. ♂ genitalia with short costa and short, broad and pointed sacculus (Fig. 607). Octavals somewhat pentagonal. ♀ genitalia (Fig. 835) strongly elongated; sterigma broadly crescentic. Zimbabwe: Hunyani River ..... 22. *hunyani* sp. n., p. 142
- Adult as in Figs 204, 205. ♂ unknown. ♀ genitalia (Fig. 836) similar but with sterigma more angular. Zimbabwe: Melsetter (now Chimanimani) District ..... 23. *melsetter* sp. n., p. 142
- 10(8) Slightly larger than related species, with strongly developed postmedian line (Fig. 207, 208). ♂ genitalia (Fig. 609) with pointed costa; octavals as illustrated. ♀ genitalia (Fig. 837) resembling those of *C. brunnescens* (Fig. 832). Zimbabwe: Inyanga Mts ..... 25. *pinheyi* sp. n., p. 143
- Adult with markings almost totally reduced (Fig. 209). ♂ genitalia (Fig. 610) with pointed costa, though slightly more rounded than in *pinheyi*; octavals very much as in above species. ♀ unknown. Zimbabwe: Bromley District ..... 26. *deleta* sp. n., p. 143
- 11(5) Distal margin of octavals in ♂ not hairy (Figs 612, 613); ♀ genitalia, where known, as in Fig. 839 ..... 12
- Distal margin of octavals in ♂ hairy (Figs 614–617); ♀ genitalia as in Figs 840–843 ..... 13
- 12(11) Adult fairly small (fw length 11–15 mm), fore wings marked with bold transverse lines (Fig. 211–213). ♂ genitalia (Fig. 612) with normal uncus and termen of costa strongly concave. ♀ genitalia as in Fig. 839. Madagascar ..... 28. *orthostates* (Prout), p. 144
- Adult larger (fw length 15 mm), markings less prominent (Fig. 214). ♂ genitalia (Fig. 613) with uncus bell-shaped, with three horns in central position; costa not concave. ♀ unknown. South-west Tanzania ..... 29. *iringa* sp. n., p. 145
- 13(11) Medium-sized moths (fw length 12–16 mm) (Figs 215–217). ♂ genitalia (Figs 614, 615) with costa of valve curved and rounded and protruding sacculus. ♀ genitalia (Figs 840, 841) with lateral dilatations on apophyses posteriores ..... 14
- Large moths (fw length 16–19 mm) (Figs 218–222). ♂ genitalia with costa of valve apically truncated (Fig. 616) or rounded, with short ventral process (Fig. 617). ♀ genitalia (Figs 842, 843) with unmodified apophyses ..... 15
- 14(13) Adult as in Figs 215, 216. ♂ genitalia (Fig. 614) with two long, separated teeth on sacculus. ♀ genitalia (Fig. 840) with sterigma broadly crescent-shaped. South Africa to Rwanda; Cameroon ..... 30. *johnstoni* (Butler), p. 145
- Adult as in Fig. 217. ♂ genitalia (Fig. 615) with sclerotization on sacculus not separated into two teeth. ♀ genitalia (Fig. 841) with sterigma more angular. North-eastern Zimbabwe to Uganda ..... 31. *semicolor* (Warren), p. 146

- 15(13) Adult variable, as in Figs 218–220. ♂ genitalia (Fig. 616) with costa typically truncated. ♀ genitalia elongated, as in Fig. 842. Zimbabwe to Urundi; Angola .....  
..... 32. *rhabdophora* (Holland), p. 147
- Adult less variable (Figs 221, 222). ♂ genitalia with costa curved, with short ventral process (Fig. 617). ♀ genitalia elongated, of about equal width throughout (Fig. 843). Eastern Transvaal and Swaziland .... 33. *nobilitata* (Prout), p. 148

### 18. *Chiasmia semitecta* (Walker, 1861) comb. n.

Figs 193–195; 603, 831; 990

*Panagra semitecta* Walker, 1861: 987. Holotype ♂, S[outh] Afr[ica]/60 89; 3. *Panagra semitecta* (BMNH) [examined].

*Macaria gnophosata* Walker, [1863]: 1645. Holotype ♂, [South Africa, Western Cape]: Cape Town, April/61 102; *Macaria gnophosata* (BMNH) [examined].

*Macaria semitecta* (Walker); Janse, 1917: 114.

*Semiothisa semitecta* (Walker); Janse, 1932: 232.

*Macaria gnophosata* Walker; Janse, 1932: 232 (synonymy).

FORE WING LENGTH. 12–14 mm (♂), 13–16 mm (♀).

ADULT (Figs 193–195). Ground colour of wings whitish grey with varying degree of dark suffusion. Basal line moderately well developed on fore wing, absent on hind wing; median line mostly well developed on both wings, but not sharply defined. Postmedian prominent on both wings, curved. Apical streak small, inconspicuous. Discal spots elongated and prominent on fore wing; smaller on hind wing. Postmedian area markedly darker than basal and median areas, frequently with a black spot near end of cell and a row of smaller whitish spots. Males usually paler, with more clearly defined markings. Underside: whitish grey with dense grey-brown suffusion, development of markings similar to upperside. Discal spots large. Vestiture of thorax and abdomen concolorous with wings. Hind tibia of ♂ dilated. Setal comb on A3 absent.

MALE GENITALIA (Fig. 603). Uncus horns slender; gnathos with rather broad medial element. Valves short and stout, costa forming well developed spatula; sacculus large and rounded, exhibiting a conspicuous serrated ridge along inner margin. Aedeagus long and straight, vesica without cornuti. Octavals very large, deeply emarginate.

FEMALE GENITALIA (Fig. 831). Papillae anales elongated. Apophyses slender; a. anteriores about two-thirds length of a. posteriores. Operculum small. Sterigma: l. ante vaginalis extensively developed. Antrum short.

Bursa copulatrix resembling a small, gradually widening tube. Signum small and circular.

DIAGNOSIS. A variable species; the ground colour ranges from whitish grey with strongly developed markings to slate grey with markings nearly absent; however, most specimens correspond to the description given above. Confusion is possible with the allopatric (see distribution) 20. *C. grisescens* (Prout), in which the postmedian line is finer and less curved and which has smaller discal spots, and with 19. *C. brunnescens*, in which the ground colour has a brownish tinge. Externally also similar is 22. *Isturgia exerraria* (Prout); however, the males of this species have clearly bipectinate antennae.

DISTRIBUTION (Fig. 990). Southern Africa, found in the Free State and Cape Province of South Africa south of 28°S, but absent from the more arid interior; also single records from the former Transkei and Lesotho.

BIOLOGY. *Chiasmia semitecta* is largely confined to the Cape and occurs in fynbos as well as Karroo habitats. The larva may feed on *Helichrysum* or related genera (N.J. Duke, pers. comm. and see chapter on biogeography). Adults were collected from January to May, in August and from October to December.

MATERIAL. 67 ♂ (3 dissected, TM genitalia prep. No. 10912, 10919, 11054) and 59 ♀ (6 dissected, TM genitalia prep. No. 10886, 10913, 10920–22, 10924). 108 Pretoria (TM), 1 Cape Town (SAM), 15 N.J. Duke collection, 1 D.M. Kroon collection, 1 H. Geertsema collection.

LOCALITIES. **South Africa, Cape Province:** [Western Cape]: Saasveld (5), Stormsriviermond Coastal National Park (2), Bontebok National Park, Swellendam Distr. (1), Jonkershoek (7), Kogelberg Nature Reserve (20), Cape Town (10), Longridge Farm, Plettenberg Bay (2), Worcester (1), De Hoop, Bredasdorp District (1), Sedgefield (2), Camps Bay (2), Beaufort West (1), Constantia (1), Deepwalls Forest Reserve/Knysna (1), Murray'sburg (1), Stellenbosch (1). [Eastern Cape]: Farm Godvertrouw, SW. Papiesvlei (11), Beacon Bay (10), Aliwal North (2), Grahamstown (4), Graaff-Reinet (3), Perseverance/Rietbron (1), Coega (1), Hogsback (2), Steynsburg (1), Tsitsikama, De Plaat Forest (1), Umtata (2), The Haven (1). [Northern Cape]: P.K. Le Roux Dam, Van der Kloof (5). **Free State:** Bloemfontein (1), Golden Gate (1), H.F. Verwoerd Dam (7), Farm Italy, Ladybrand District (12), Fouriesburg (1), Smithfield (1). **Lesotho:** Katse (1).

### 19. *Chiasmia brunnescens* sp. n.

Figs 196, 197; 604, 832; 991

TYPE MATERIAL. Holotype ♂, [South Africa, East-

**ern Cape:** Cape [Province], Aliwal North, 11.4.[19]81 (N.J. Duke); TM Lep[idoptera] Het[erocera] Genitalia slide No. 10914 (TM). Paratypes (5♂, 2♀). **[South Africa, Eastern Cape]:** 1♀, same data as holotype, TM Lep. Het. Genitalia slide No. 10915; 4♂, 1♀, *ibidem*, dated 4.I.1984. **[Free State]:** 1♂, Trompsburg, O.F.S., 25.X.1948 (Dr. G. van Son) (TM, N.J. Duke collection).

FORE WING LENGTH. 12–13 mm (♂), 14 mm (♀).

ADULT (Figs 196, 197). Antennae brown. Ground colour of wings light whitish-grey to ochreous with darker irroration. All three lines well developed on fore wing, median more like a fascia; on hind wing, basal line absent, median line poorly developed, and postmedian line well developed but thin. Postmedian area darker, with an ill-defined, pale band and two pairs of dark brown spots present on fore wing. Discal spots well developed and elongated on fore wing, round and weakly formed on hind wing. Underside: whitish-grey to ochreous with dense darker irroration; lines and discal spots faint. Vestiture of thorax and abdomen concolorous with wings. Hind tibia of ♂ not modified; setal comb on A3 absent.

MALE GENITALIA (Fig. 604). Uncus horns small; gnathos with rather large medial element. Costa of valve short, pointed, strongly spatulate. Sacculus large and rounded, exhibiting a group of sclerotized teeth below apex. Juxta squarish. Aedeagus small and fusiform; vesica without cornuti. Octavals large, somewhat pentagonal.

FEMALE GENITALIA (Fig. 832). Papillae anales narrow and elongated. Apophyses elongated, a. posteriores nearly twice length of a. anteriores. Sterigma: l. antevaginalis very large, somewhat angular; l. postvaginalis forming rounded sclerotizations around ostium. Antrum small, cylindrical. Bursa copulatrix small and elongated, bursa wall membranous throughout. Signum rather small, with very short spicula.

DIAGNOSIS. Similar to 18. *C. semitecta*, but may be recognized by its brownish ground colour; *C. semitecta*, while variable, is always marked in different shades of grey. In the male genitalia, the best diagnostic characters are provided by the differently shaped octavals, while in the female genitalia the sterigma permits ready identification (compare Figs 831 and 832).

DISTRIBUTION (Fig. 991). South Africa, only known from two localities in the north-eastern Cape Province and the southern Free State.

BIOLOGY. Vegetation at the type localities consists of grassland and Karoo elements. The type specimens were collected in April and in October.

ETYMOLOGY. From Latin *brunnescens*, turning brownish; after the characteristic ground colour.

## 20. *Chiasmia grisescens* (Prout, 1916)

Figs 198, 199; 605, 833; 991

*Discalma grisescens* Prout, 1916a: 173. Holotype ♂,

**[Zimbabwe]:** (S[outhern] Rhodesia), V.1913 (F.W. Short); abdomen guaranteed L[ouis] B[eethoven] P[rout]; L.B. Prout Collection Brit. Mus. 1939–543; *Discalma grisescens* Prout ♂ type; Ann[als of the] Trans[vaal] Mus[eum] v.173 (1916) (BMNH) [examined]. Paratypes (3♂, 2♀). **[Zimbabwe]:** 3♂, 1♀, *ibidem*, dated November 1911 (♀), and January, February, and August 1913, respectively [examined].

**[South Africa, Gauteng]:** 1♀, Pretoria, 23. VIII.[19]13 (A.J.T. Janse); *Discalma grisescens* Prout ♀; *Discalma grisescens* Prout Paratype No. 4756 (TM) (BMNH, TM) [examined].

*Macaria grisescens* (Prout); Janse, 1917: 113.

*Macaria dolichostigma* Prout, 1922a: 174. Holotype ♂, **[South Africa]:** Pretoria, 28.2.[19]16 (A.J.T. Janse); *Macaria dolichostigma* Prout ♂ type; G. 1396; *Macaria dolichostigma* Prout ♂ type No. 2356 (TM) [examined].

*Semiothisa grisescens* (Prout); Janse, 1932: 227.

*Macaria dolichostigma* Prout; Janse, 1932: 227 (synonymy).

FORE WING LENGTH. 12–14 mm (both sexes).

ADULT (Figs 198, 199). Antennae whitish-grey. Ground colour of wings whitish in male, whitish-grey to grey in female, with darker suffusion in both sexes. Basal line weakly developed on fore wing, nearly absent on hind wing. Median line moderately well to weakly developed; postmedian usually prominent. Postmedian area darker than basal and median areas, particularly in male; a dark grey, round spot present on each wing. Discal spots developed though sometimes small. Underside: markings of male richer in contrast; postmedian area pale brown with series of whitish blotches, discal spots well developed. Markings of female as on upperside, lines less clearly defined, discal spots nearly absent. Vestiture of thorax and abdomen pale grey. Hind tibia of ♂ not modified. Setal comb on A3 absent.

MALE GENITALIA (Fig. 605). Uncus horns rather long; gnathos taking the form of a narrow band. Costa of valve short, stout, not strongly spatulate. Sacculus medium-sized, exhibiting a number of discrete sclerotizations. Aedeagus slender, nearly straight; vesica without cornuti. Octavals arcuate, well rounded.

FEMALE GENITALIA (Fig. 833). Papillae anales large. Apophyses posteriores elongated and slender; a. anteriores rather more than two-thirds length of a. posteriores. Sterigma with l. antevaginalis slightly modified. Ostium simple, capped by a broadly triangular operculum. Antrum small and inconspicuous. Bursa

copulatrix small and pear-shaped. Signum-medium-sized, with very short spicula.

**DIAGNOSIS.** Similar to *Chiasmia semitecta*, it can be separated externally from that species by the finer lines and the frequently lighter ground colour. In the male genitalia, *C. grisescens* can be distinguished from *semitecta* by the much smaller and more pointed sacculus, the smaller aedeagus and the differently shaped octavals. In the female genitalia, *grisescens* is characterized by its simple sterigma (compare Figs 831 and 833). In addition, distributional data may be helpful; *C. grisescens* has so far only been collected from few localities in the Transvaal and Zimbabwe, and San Martinho in Moçambique, while *C. semitecta* is practically restricted to the Cape Province, with only very few records from the Free State.

**DISTRIBUTION** (Fig. 991). Southern Africa, known from relatively few widely separated localities in the Transvaal, southern Moçambique and Zimbabwe.

**BIOLOGY.** *Chiasmia grisescens* is associated with savanna; the Moçambican specimens were collected in September, those from the Transvaal in February and March. Females are about twice as common in collections than males (see below).

**MATERIAL.** 11♂ (2 dissected, TM genitalia slides No. 968, 10910) and 23♀ (2 dissected, TM genitalia slides No. 10911, 10923), 28 Pretoria (TM), 1 Cape Town (SAM), 3 N. J. Duke collection, 1 H.S. Staude collection, 1 P. Roos collection.

**LOCALITIES.** **South Africa, Transvaal:** [Gauteng]: Pretoria (19). [North-West]: Rustenburg (1). [Northern Province]: Louis Trichardt (1), Mountain Inn/Louis Trichardt (3), Buzzard Mountain Retreat, Soutpansberg (1). **Moçambique:** San Martinho (7). **Zimbabwe:** Hope Fountain (1), Laurenceville, Vumba (1).

## 21. *Chiasmia murina* sp. n.

Figs 200, 201, 606, 834; 992

**TYPE MATERIAL.** Holotype ♂, **Zimbabwe:** Laurenceville, Vumba, 18.-22.10.[19]89 (N.J. Duke); TM Lep[idoptera] Het[erocera] Genitalia slide No. 11025 (TM). Paratypes (2♂, 11♀). **Zimbabwe:** 1♂, 4♀, same data as holotype, TM Lep[idoptera] Het[erocera] Genitalia slide No. 11026; 1♂, 2♀ *ibidem*, dated 10.-15.X.1990; 1♀, Vumba, dated 13.XI.1966 (B.D. Barnes); 1♀, *ibidem*, dated 30.XI.1965; 3♀, Vumba, Umtali, S[outhern] Rhodesia, XI.1963 (National Museum South Rhodesia) (NMBZ, TM, N.J. Duke collection).

**FORE WING LENGTH.** 14 mm (♂), 13-14 mm (♀).

**ADULT** (Figs 200, 201). Small and weakly marked.

Antennae whitish, shortly pectinate in male, simple in female. Wings whitish-grey, with dense mouse-grey irroration, darker in postmedian area. Basal and median lines weakly developed, nearly absent in female; postmedian line well developed in male, weakly developed in female. Discal spots present, less prominent in female. Underside: basal and median areas whitish, densely irrorated with grey, postmedian area grey. Discal spots poorly developed. Vestiture of thorax and abdomen concolorous with wings. Hind tibia of ♂ somewhat dilated. Seta comb on A3 absent.

**MALE GENITALIA** (Fig. 606). Uncus horns fairly long; gnathos with broad medial element. Costa of valve pointed, forming a slender spatula. Sacculus large, also pointed, with several discrete sclerotizations as in figure. Aedeagus elongated and cylindrical; vesica without cornuti. Octavals arcuate, very broadly rounded.

**FEMALE GENITALIA** (Fig. 834). Papillae anales rounded, appearing swollen. Both pairs of apophyses posteriores rather short and delicate. Sterigma with small, crescentic l. antevaginalis. Operculum triangular. Bursa copulatrix large for the group. Ductus bursae short and narrow, abruptly widening into pear-shaped corpus. Signum of medium size, with short spicula.

**DIAGNOSIS.** In appearance rather like a species of *Isturgia*. Genitalia structure indicates that *C. murina* is closest to 22. *C. humyani* and 23. *melsetter*, below. Externally, *C. murina* can be recognized by its pure mouse-grey colour and the more sharply defined lines compared with the above species. In the male genitalia, *C. murina* can be separated from *C. humyani* by the shorter uncus horns, the differently shaped octavals and, most importantly, by the costa of the valve which is clearly longer than the sacculus (barely longer in *C. humyani*). In the female genitalia, *murina* is also very close to both *C. humyani* and *melsetter*, below. They can be most easily separated by the size of the triangular process (modified operculum ?) above the ostium and the size of the sterigma. In *murina*, the process is long and narrow and the sterigma small; in *C. melsetter*, the process is rather squat and the sterigma large and somewhat rectangular. In *C. humyani*, the process is thimble-shaped and the sterigma broadly crescentic (see figures). The bursa copulatrix is relatively largest in *C. murina*.

**DISTRIBUTION** (Fig. 992). Vumba Mountains in eastern Zimbabwe, at low altitudes.

**BIOLOGY.** The vegetation at the type locality consists of savanna, mixed with riverine forest (N.J. Duke, *pers. comm.*). Adults have been collected in October-November.

**ETYMOLOGY.** From Latin adjective *murinus* (-a, -um), mouse grey; in allusion to the ground colour of the wings.

## 22. *Chiasmia hunyani* sp. n.

Figs 202, 203; 607, 835; 992

**TYPE MATERIAL.** Holotype ♂, [Zimbabwe]: (Southern Rhodesia), Hunyani River, 13.8.[19]78 (N.J. Duke); TM Lep[idoptera] Het[erocera] Genitalia slide No. 11022 (TM). Paratypes (1♂, 1♀). [Zimbabwe]: 1♂, *ibidem*, dated 26.XII.1978; 1♀, *ibidem*, dated 17.9.[19]78; TM Lep. Het. Genitalia slide No. 11023 (TM).

**FORE WING LENGTH.** 13 mm (both sexes).

**ADULT** (Figs 202, 203). Antennae mixed black-and-white, very shortly pectinate in ♂, simple in ♀. Wings whitish-grey, densely irrorated with dark grey. Basal and median lines absent, postmedian line weakly defined in ♂, virtually absent in ♀. Discal spots present, larger on fore wing, but very small in ♀. Underside: whitish, densely irrorated with grey. Discal spots present in ♂, absent in ♀. Vestiture of thorax and abdomen concolorous with wings. Hind tibia of ♂ not modified. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 607). Uncus horns short and robust; gnathos broadly rounded. Costa of valves short and stout, conspicuously angled. Sacculus large and pointed, exhibiting some small, discrete sclerotizations near apex. Aedeagus small and cylindrical; vesica without cornuti. Octavals large, somewhat pentagonal.

**FEMALE GENITALIA** (Fig. 835). Papillae anales large. Both pairs of apophyses delicate, a. anteriores slightly over half length of a. posteriores. Operculum small, thimble-shaped. Sterigma large, broadly crescent-shaped. Bursa copulatrix small and flask-shaped; ductus very gradually widening into corpus. Signum medium-sized, with very short spicula.

**DIAGNOSIS.** Confusion is possible with *C. melsetter*, below, and, to a lesser extent, with *C. murina*, above. The diagnostic characters are discussed under *C. murina*. One of the ♂ paratypes above which has fairly well developed markings resembles small specimens of 1. *Isturgia catalaunaria*.

**BIOLOGY.** The three known specimens were collected in August–September and in December. The vegetation at the type locality consists of *Brachystegia* woodland with substantial undergrowth (N.J. Duke, *pers. comm.*).

**DISTRIBUTION** (Fig. 992). Known only from the type locality, Hunyani River in northern central Zimbabwe.

**ETYMOLOGY.** Named after the type locality.

## 23. *Chiasmia melsetter* sp. n.

Figs 204, 205; 836; 992

**TYPE MATERIAL.** Holotype ♀, [Zimbabwe]: (Southern Rhodesia), Melsetter, 21.11.[19]68 (A.J. Duke); TM Lep[idoptera] Het[erocera] Genitalia slide No. 11024 (TM). Paratype (1♀). [Zimbabwe]: same data as holotype (TM).

**FORE WING LENGTH.** 13 mm (holotype), 14 mm (paratype).

**ADULT ♀** (Figs 204, 205). Antennae brown. Ground colour of wings whitish-grey, densely irrorated with darker grey. Basal line very weakly developed, median line well developed in one specimen, nearly absent in the other. Postmedian line very fine. Discal spots present, blackish. Postmedian area darker than basal and median areas. Underside: whitish grey, densely irrorated with grey, especially postmedian area. Median line weakly developed or absent. Discal spots faint. Vestiture of thorax and abdomen concolorous with wings.

**FEMALE GENITALIA** (Fig. 836). Papillae anales large. Apophyses posteriores long, slender; a. anteriores shorter and stouter. Operculum small, broadly triangular. Sterigma with large, squarish l. antevaginalis. Bursa copulatrix small and elongated, pear-shaped, with ductus gradually widening into corpus bursae. Signum larger than in related species.

**DIAGNOSIS.** Very similar to 22. *C. hunyani* and, to a lesser degree, to 21. *C. murina*. Externally, *C. melsetter* can be recognized by its brown antennae (black-and-white in the other two species). For differences in the genitalia, see diagnosis given under *C. murina*.

**BIOLOGY.** The vegetation at the type locality consists of grassland with elements of bush and forest in gorges (N.J. Duke, *pers. comm.*). The two specimens known were collected in November.

**DISTRIBUTION** (Fig. 992). So far only known from two specimens from the Melsetter area (now Chimanimani) in eastern Zimbabwe.

**ETYMOLOGY.** Named after the type locality.

## 24. *Chiasmia bomfordi* sp. n.

Figs 206; 608; 993

**TYPE MATERIAL.** Holotype ♂, [Zimbabwe]: S[southern] Rhodesia, Marandellas, I.1960 (P. Bomford); genitalia slide L 698 (NMBZ). Paratypes (2♂). [Zimbabwe]: 1♂, same data as holotype; 1♂, S[southern] Rhodesia, Hunyani River, 26.12.[19]78 (N.J. Duke) (NMBZ, TM).

**FORE WING LENGTH.** 12–13 mm (♂).

**ADULT ♂** (Fig. 206). Barely medium-sized. Anten-

nae white, mixed with brown scales. Ground colour of wings white, densely dusted and striated with greyish-brown. All three lines developed with exception of basal on hind wing; median poorly defined, more like a fascia. Postmedian relatively best developed, angled below costa of fore wing. Discal spots present but inconspicuous. Underside similar but somewhat paler, with fainter markings. Vestiture of thorax and abdomen greyish-white. Hind tibia of ♂ not modified. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 608). Uncus horns moderately well developed; gnathos broad, with narrow arms and medial element. Valves massive; costa angled near base, then straight and forming slender spatula. Valvula with small bulge. Sacculus 2–2.5 times width of costa, apex rounded. Inner margin of sacculus well defined, bearing some discrete sclerotizations. Aedeagus slender, subcylindrical and with a constriction between tip and middle; no cornuti present. Octavals large and rather deeply cleft.

**DIAGNOSIS.** This species is easily recognized on account of its very pale, 'peppered' appearance.

**BIOLOGY.** *Chiasmia bomfordi* seems to inhabit savanna or woodland at elevations above 1500 m. Adults have been found in December and January.

**DISTRIBUTION** (Fig. 993). So far only known from two localities in north-eastern Zimbabwe, approximately 60 km apart.

**ETYMOLOGY.** Named in honour of Peter Bomford, who collected part of the type series.

## 25. *Chiasmia pinheyi* sp. n.

Figs 207, 208; 609, 837; 993

**TYPE MATERIAL.** Holotype ♂, [Zimbabwe]: S[outhern] Rhodesia, Marowe River, Brondesbury Park, Inyanga, 13.II.1978 (leg. E. Pinhey), Nat[ional] Mus[eum] S[outhern] Rhodesia; genitalia slide L 699 (NMBZ). Paratypes (1♂, 1♀). **Zimbabwe:** Nyanga Nat[ional] Park, 5.–9.XII.1993, leg[unt] Mey & Ebert (dissected, ZMHB genitalia slides M. Krüger No. 1, 2) (ZMHB).

**FORE WING LENGTH.** 14 mm (♂), 16 mm (♀).

**ADULT** (Figs 207, 208). Of medium size. Antennae white, mixed with brown scales. Apex of fore wing pointed. Ground colour of wings whitish, completely suffused with purplish-grey, and with even, dark dusting. Postmedian area somewhat darker. Basal and median lines faint or absent, postmedian well developed, bold. Discal spots dark grey. Underside: basal and median area whitish with very dense

purplish-brown striation; postmedian area nearly totally purplish-brown. Postmedian line and discal spots shining through. Vestiture of thorax and abdomen concolorous with wings, lighter on underside. Female similar but considerably larger. Hind tibia of ♂ not modified. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 609). Very similar to 24. *C. bomfordi*, above, and differing only in the more strongly curved costa of the valve, the sclerotizations at the tip of the sacculus and the shape of the octavals (compare Figs 608 and 609).

**FEMALE GENITALIA** (Fig. 837). Similar to 19. *C. brunnescens* above. Papillae anales moderately broad, with rounded tips, weakly setose. Apophyses slender, fairly long; a. posteriores between half and two-thirds length of a. anteriores. Sterigma strongly developed, angular, with posterior edges produced and slightly wrinkled. Ostium bursae circular, leading into a short and narrow antrum. Bursa copulatrix proper small and pear-shaped, signum with indistinct spicula and three delicate, transverse sclerotized ridges.

**DIAGNOSIS.** In facies, *Chiasmia pinheyi* somewhat recalls 30. *C. johnstoni* and its close allies, rather than the other species near *C. grisescens*. The genitalia, however, clearly show its close relatedness to these taxa. Its relatively large size and prominent postmedian line are typical.

**BIOLOGY.** Apparently a mountainous species. Adults were collected in December and February.

**DISTRIBUTION** (Fig. 993). Inyanga Mountains in north-east Zimbabwe.

**ETYMOLOGY.** Named in honour of E.C.G. Pinhey, who collected the holotype.

## 26. *Chiasmia deleta* sp. n.

Figs 209; 610; 993

**TYPE MATERIAL.** Holotype ♂, [Zimbabwe]: S[outhern] Rhodesia, Melfort Siding, Bromley, 7.V.1968 (leg. Miss C. Gibbs), Nat[ional] Mus[eum] S[outhern] Rhodesia; 31; genitalia slide L 700 (NMBZ).

**ADULT ♂** (Fig. 209). Barely medium-sized. Antennae white, mixed with brown scales. Ground colour of wings whitish, suffused with pale grey and showing fine and even darker grey dusting. Postmedian area almost imperceptibly darker. Wings markingless except for faint traces of postmedian line and small and inconspicuous discal spots. Underside very similar, irroration somewhat coarser. Hind tibia of ♂ simple. Seta comb on A3 absent.

**MALE GENITALIA** (Fig. 610). Very similar to 24. *C.*

*bomfordi* and 25. *C. pinheyi*, above, but with the following differences: valves shorter, with costa more strongly curved than in *bomfordi*, and inner margin of base of saccus parallel to outer margin.

**DIAGNOSIS.** Similar to 22. *C. hunyani* and, to a lesser extent, 23. *C. melsheimeri* in the extreme reduction of the wing markings. The differences in genitalia structure may be seen from the illustrations (compare Figs 607, 610 and 835, 836).

**BIOLOGY.** *Chiasmia deleta* is presumably an inhabitant of savanna or woodland at elevations above 1500 m; the holotype was collected in autumn (May).

**DISTRIBUTION** (Fig. 993). Known from a single locality in north central Zimbabwe.

**ETYMOLOGY.** From Latin *deleo*, to wipe out or to erase; the wings are practically devoid of markings.

## 27. *Chiasmia alternata* (Warren, 1899) comb. n.

Figs 210; 611, 838, 994

*Gonodela* [sic] *alternata* Warren, 1899b: 306.  
LECTOTYPE ♀, here designated, [Moçambique]: Delagoa Bay; vi 306/*Gonodela alternata* Warr. ♀ type; Rothschild Bequest B.M.1939-1 (BMNH) [examined]. Paralectotype (1 ♀). [Moçambique]: same data as holotype (BMNH) [examined].

*Macaria alternata* (Warren); Janse, 1917: 114.  
*Semiothisa alternata* (Warren); Janse, 1932: 230.

**FORE WING LENGTH.** 9–10 mm (♂), 10–11 mm (♀).

**ADULT** (Fig. 210). The smallest species of the *semitecta*-group. Antennae whitish. Ground colour of wings white, densely irrorated with blackish-brown. All three lines rather broad on fore wing; basal line absent on hind wing. A broad, dark postmedian and terminal fascia of varying intensity present; between these is situated a narrower white band. Discal spots present, but rather inconspicuous. Underside: similar to upperside. Vestiture of thorax and abdomen whitish-grey. Hind tibia of ♂ somewhat dilated. Seta comb on A3 absent.

**MALE GENITALIA** (Fig. 611). Small. Uncus horns very short; gnathos very narrow, medial element not wider than arms. Costa of valves rounded, hardly spatulate. Sacculus with few sclerotizations, inner margin well defined and sclerotized. Aedeagus small and slender, straight; vesica without cornuti. Octavals extending across most of abdomen, rounded.

**FEMALE GENITALIA** (Fig. 838). Papillae anales normal. Apophyses posteriores long and slender; a. anteriores stouter, less than half length of former. Sterigma with rectangular, posteriorly pointed lamella

antevaginalis. Ostium and antrum very small. Bursa copulatrix small. Membranous part of ductus bursae gradually widening into small and elongated corpus bursae. Signum medium-sized, nearly circular.

**DIAGNOSIS.** This small, black-and-white species cannot be confused with any other macariine. The markings are similar to *Scopula inscriptata* (Walker) (Sterrhinae), but this species has the apex of the fore wing more pointed.

**BIOLOGY.** Unlike other members of the *C. semitecta*-group, this species is restricted to subtropical and tropical coastal forests and does not range far inland. Adults were collected from January–April, in June and from October–November, but most commonly in February–March.

**DISTRIBUTION** (Fig. 994). Found along the east coast of southern Africa between 26° and 30°S, from southern Moçambique to Durban in KwaZulu-Natal Province, South Africa.

**MATERIAL.** 21♂ (3 dissected, TM genitalia slides No. 10844, 10845, 11154) and 29♀ (3 dissected, TM genitalia slides No. 10992, 11112, 11155). 36 Pretoria (TM), 1 Pretoria (SANC), 1 Cape Town (SAM), 1 Bulawayo (NMBZ), 9 N.J. Duke collection, 1 D.M. Kroon collection, 1 H.S. Staude collection.

**LOCALITIES.** **South Africa, KwaZulu-Natal:** Dukuduku Forest (23), St. Lucia Bay (5), Hluhluwe/False Bay (1), Nyalazi Forest/Mtubatuba (1), Nyalazi River (2), Inyalazi River (1), Durban (2), Shangwana, Ingwavuma Distr (1), Palindaba, 10 m W. Maputa (1), Umhlanga Rocks (4). Zululand, no further data (1). **Moçambique:** Lourenço Marques (1), Delagoa Bay (1), Inyack Island (6).

## 28. *Chiasmia orthostates* (Prout, 1915) comb. n.

Figs 211–213; 612, 839

*Macaria orthostates* Prout, 1915a: 349. Holotype ♂, Madagascare: Tananarive, Collection Le Moult; Collection Chulliat; Nov[itates] Zool[ogicae] xxii p.352 (1915)/*Macaria orthostates* Prout ♂ type; Rothschild Bequest B.M.1939-1 (BMNH) [examined].

*Semiothisa orthostates* (Prout); Herbule, 1956: 249; 1972: 144.

**FORE WING LENGTH.** 11–15 mm (♂), 11–14 mm (♀).

**ADULT** (Figs 211–213). Ground colour of wings whitish with extensive grey irroration, so as to appear mouse-grey. All three lines well developed on fore wing, in particular postmedian; on hind wing, basal line absent and median and postmedian weakly developed. Discal spots present, but inconspicuous. Postmedian area of fore wing with a usually conspicuous, elliptical

dark spot. Underside whitish, with dense fuscous irroration, postmedian area entirely fuscous except for some white maculae. Discal spots absent. Vestiture of body grey. Hind tibia of ♂ slightly dilated; setal comb on A3 absent.

**MALE GENITALIA** (Fig. 612). Uncus horns long and slender; gnathos not particularly deeply emarginated, band-like. Costa of valve faintly trapezoidal, broadly truncated and notched at apex; sacculus large, bearing small, discrete sclerotizations. Aedeagus long, very slender; vesica without cornuti. Octavals conspicuous, arcuate.

**FEMALE GENITALIA** (Fig. 839). Papillae anales medium-sized. Both pairs of apophyses slender; a. posteriores approximately two-thirds length of a. anteriores. Sterigma broadly crescentic. Antrum pentagonal. Bursa copulatrix small, resembling a short, curved tube. Signum small, three-pronged.

**DIAGNOSIS.** The only representative of the *semitecta*-group on Madagascar. Externally, the comparatively heavily marked lines on the fore wing and nearly markingless hind wings are typical, while in the genitalia the truncated costa of the valve is characteristic.

**BIOLOGY.** According to label data from the Institut Scientifique de Madagascar, the species was reared there on *Helichrysum triplinerve*. Development from hatching of larvae to emergence of adults was completed in 30–40 days. In the wild, adults were collected in January, March, and December. *C. orthostates* is mostly collected in fairly moist forest, but occurs in disturbed habitats as well, e.g. in the Tsimbazaza Park in the capital Tananarivo (C. Herbulot, *in litt.*).

**DISTRIBUTION.** Restricted to Madagascar where it is mostly found in the eastern provinces.

**MATERIAL.** 21♂ (1 dissected, TM genitalia slide No. 11182) and 10♀ (1 dissected, TM genitalia slide No. 11183). 21 London (BMNH), 1 Munich (ZSBS), 9 Pretoria (TM).

**LOCALITIES.** **Madagascar:** no further data (1), Station Perinet, 149 km east of Tananarivo (8), Sahambavy nr. Fianarantsoa, 1040–1180 m (1), Tsimbazaza, Tananarivo (6), Tananarive (1), Ankaratra, Manjakatombo (3), Mananjara (3), Mananjary (8).

## 29. *Chiasmia iringa* sp. n.

Figs 214; 613

**TYPE MATERIAL.** Holotype ♂, [Tanzania]: Iringa, Tang[anyika], 40 m[iles] South, 10.III.1950 (N. Mitton); TM Lep[idoptera] Het[erocera] genitalia slide No. 11246 (TM).

**FORE WING LENGTH.** 15 mm (♂ holotype).

**ADULT ♂** (Fig. 214). Well medium-sized. Antennae shortly bipectinate. Termen of hind wing crenulated, but lacking tail. Ground colour of wings whitish, but very densely and evenly suffused with grey. Lines marginally darker grey, inconspicuous; median line relatively best developed. Discal spots also faint. Underside similar but grey irroration somewhat less dense and wings therefore appearing lighter. Markings as on upperside. Vestiture of thorax and abdomen concolorous with wings, lighter on underside. Hind tibia of ♂ not dilated. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 613). Uncus broad, bell-shaped; three small horns present. Gnathos prominent, well sclerotized. Costa of valve slightly curved, hardly dilated towards apex. Sacculus broadly triangular, with small sclerotizations confined to tip. Aedeagus small and slender, acutely pointed; vesica without cornuti. Octavals faintly sclerotized, broadly w-shaped; posterior margin bearing a fringe of elongated scales.

**DIAGNOSIS.** Easily separated externally from similar-sized members of the group, such as 30. *johnstoni* and 31. *semicolor*, by its more uniform grey wings, particularly on the underside. In the male genitalia, the main differences are found in the shape of uncus and gnathos, the hardly sclerotized sacculus, and the faint octavals. The moth also bears some resemblance to dark specimens of 1. *Isturgia catalamaria*.

**BIOLOGY.** The type locality, Iringa, is at an elevation of approximately 1500 m. The only known specimen was collected in March.

**DISTRIBUTION.** South-western Tanzania.

**ETYMOLOGY.** Named after the type locality.

## 30. *Chiasmia johnstoni* (Butler, 1893) comb. n.

Figs 215, 216; 614, 840, 995

*Tephrina johnstoni* Butler, 1893: 683. LECTOTYPE ♂, here designated, [Malawi]: Zomba (Johnston), December 1892, 93–124/*Tephrina johnstoni* Butler type (BMNH) [examined].

*Tephrina johnstoni* Butler; Swinhoe, 1904: 509 (as junior synonym of *S. rhabdophora* (Holland, 1892)).

*Macaria johnstoni* (Butler); Hampson, 1910: 468; Janse, 1917: 113.

*Semiothisa johnstoni* (Butler); Janse, 1932: 230; Fletcher, 1958b: 131; Pinhey, 1975: 87.

**FORE WING LENGTH.** 12–15 mm (♂), 13–16 mm (♀).

**ADULT** (Figs 215, 216). Antennae white, mixed with single brown scales. Apex of fore wings pointed. Ground colour of wings chalk-white, appearing light

grey due to numerous fine grey striae. All three lines well developed and broad on fore wing; basal line absent on hind wing. Discal spots small, dark. Postmedian area with a broad, purplish-brown fascia, narrower on hind wing. Apex of fore wing with a light grey blotch. Underside: ground colour whitish; postmedian fasciae and lines clear, light brown. Veins and discal spots also light brown. Thorax and abdomen grey. Hind tibia of ♂ not modified. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 614). Large for the size of the moth. Uncus horns robust; gnathos well developed. Costa of valves curved, forming a distinct spatula. Sacculus short and broad, bearing two large, inwardly directed, sclerotized teeth. Aedeagus long and slender, terminating in a rather acute tip. Vesica with a chitinous patch but lacking true cornuti. Octavals broadly arcuate, rather shallow.

**FEMALE GENITALIA** (Fig. 840). Papillae anales rather large. Both pairs of apophyses stout; a. posteriores with conspicuous triangular dilatations. Antrum prominent, pentagonal. Sterigma large, broadly crescentic. Bursa copulatrix small. Ductus and corpus bursae of about equal length; corpus rounded, with a fairly large signum.

**DIAGNOSIS.** A distinctive species with its chalky white ground colour and the contrasting purplish brown markings. 31. *C. semicolor* is similar on upperside, but larger and lacks the reticulate pattern on the underside of the hind wings.

**BIOLOGY.** This species occurs in a wider range of habitats than its close relatives *Chiasmia rhabdophora* and *C. semicolor*, and is also found on the Transvaal highveld and the subtropical forests of KwaZulu-Natal. Recorded altitudinal range is from sea level to 2700 m. Specimens were collected from January to April, in June and August and from October to December.

**DISTRIBUTION** (Fig. 995). In southern Africa east of 27°S, with most records from KwaZulu-Natal and Transvaal Provinces in South Africa and from Zimbabwe. Widespread in East Africa (Tanzania, Kenya, Rwanda), and also recorded from Cameroon.

**MATERIAL.** 90♂ (3 dissected, TM genitalia slides No. 970, 10916, 10917) and 50♀ (1 dissected, TM genitalia slide No. 10918), 1 Berlin (ZMHB), 5 Munich (ZSBS), 70 Pretoria (TM), 8 Cape Town (SAM), 12 Bulawayo (NMBZ), 15 Nairobi (NMKE), 3 C. Herbule collection, 11 N.J. Duke collection, 1 D.M. Kroon collection, 14 H.S. Staude collection.

**LOCALITIES.** **South Africa, Transvaal:** [Gauteng]: Modderfontein (1), Johannesburg (3), Witkoppen/Johannesburg (7), Pretoria (3), Magaliesberg (11), Suikerbosrand Nature Reserve (2), Renosterpoort, Bronkhorstspruit District (5). [Northern Province]:

Mariepskop (2), nr. Naboomspruit (1), Magoebaskloof (1), Entabeni Forest, Soutpansberg District (3), Potgietersrus (3). [Mpumalanga]: Berlin (3), Mount Sheba (2), Lydenburg, Blouhoogte (1), Pilgrim's Rest (3). Ambiguous: Rietfontein (1). **Free State:** Sasolburg (1), Mt. Everest Game Park, 2080 m (1). **KwaZulu-Natal:** Dukuduku Forest (10), St. Lucia Bay (2), Umhlanga Rocks (3), Balgowan (2), Mont-aux-Sources (2), Drakensberg, Cathedral Peak (1), Van Reenen (1), Estcourt (2), Umkomaas (1), Sarnia (1), New Hanover (1), Hilton Road (1), Umhloti Beach (1), Durban (2). **Cape Province:** [Eastern Cape]: Quinera River (1), Kubusie Forest, Stutterheim (1), Mlahlane (3). **Swaziland:** Malagwane Hill/Mbabane (1). **Zimbabwe:** Banti Forest, Chitara Hills, Umtali District (1), Bunga Forest, Vumba (8), Laurenceville, Vumba (1), Busi Farm, Chippinga (6), Essexvale (1), Sarnia Farm, Burmah Valley (1), Lowdale (1), Hunyani River (1), Harare (Salisbury) (2), Marandellas (2). **Malawi:** Bvumbwe (1), Zomba Plateau, Kuchawe Inn, 1600 m (1). **Zambia:** Mbale, Abercorn (5). **Tanzania:** Kigonsera (5). **Kenya:** Mt. Elgon (2), Kitale (2), Kathita River area, Meru (1), Nakuru (5). **Rwanda:** SW, Wincka, 2700 m (2) **Cameroon:** Babangui (1).

**REMARKS.** In Butler's description of *Tephritis johnstoni*, the number of syntypes is not clearly stated, but it can be inferred from the text that the taxon was based on at least two. However, I have only been able to trace one of these which is here designated as lectotype.

### 31. *Chiasmia semicolor* (Warren, 1899) comb. n.

Figs 217; 615, 841; 995

*Tephritis semicolor* Warren, 1899b: 311. LECTOTYPE ♂, here designated, [Uganda]: Mau, Uganda Prot[eectorate], 19.iii.[18]98 (Dr. Ansorge); High and cold country; vi 311/*Tephritis semicolor* Warr. ♂ type (BMNH) [examined]. Paralectotypes (5♂, 1♀). [Uganda]: same data as holotype; Rothschild Bequest B.M. 1939-1 (BMNH) [examined].

**FORE WING LENGTH.** 15–16 mm (♂), 15 mm (♀).

**ADULT** (Fig. 217). Antennae white, mixed with brown scales. Ground colour of wings white, densely irrorated with fine, grey striae; hind wings slightly paler. Basal line well developed on fore wing, nearly absent on hind wing. Median line present on both wings, but weak. Postmedian line well developed on fore wing, very faint on hind wing. Postmedian area of fore wing with exception of apex and most of termen dark purplish-grey. Discal spots large and conspicuous on fore wing, minute on hind wing. Underside white, densely irrorated with orange-brown, particularly in

postmedian area. Lines faint, discal spots as on upperside. Thorax and abdomen grey. Hind tibia of ♂ not modified. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 615). Large for the size of the moth. Uncus horns large; gnathos rather narrow. Costa of valve broad and stout, spatulate. Sacculus large, somewhat pointed, with prominent apical sclerotizations and a well defined inner margin. Aedeagus elongated, somewhat fusiform, with fine apical striations. Octavals conspicuous, setose.

**FEMALE GENITALIA** (Fig. 841). Papillae anales large and pointed. Both pairs of apophyses strong; a. posteriores with conspicuous lateral dilatations near base; a. anteriores hardly shorter than a. posteriores. Antrum large, pentagonal. Bursa copulatrix relatively small and pear-shaped; signum rounded, somewhat irregular.

**DIAGNOSIS.** Similar to 30. *C. johnstoni* and 32. *C. rhabdophora*; in size it is intermediate between the two. In comparison, the upperside of the hind wing is less heavily marked in *semicolor*. The main differences lie, however, in the structure of the male genitalia. While those of *C. rhabdophora* are immediately recognisable by their peculiar truncated valvae (see Fig. 616), the best characters for separating *johnstoni* and *semicolor* are offered by the octavals and the different sclerotizations of the sacculus. It might be added that *C. semicolor* and *rhabdophora* are predominantly inhabiting the mountainous areas of central and eastern Africa, while *johnstoni* has a wide distribution in the eastern parts of southern Africa, with few records further north.

**BIOLOGY.** A species of mountainous areas of East Africa, reaching into northern Zimbabwe, but apparently less abundant there. Label data suggest a preference for 'high and cold country' in Uganda; this is certainly correct of the Zimbabwean locality (*pers. obs.*). The Zimbabwean specimens were collected in September; in Kenya, the species was observed in August. The recorded altitudinal range is 1800–2300 m.

**DISTRIBUTION** (Fig. 995). Afromontane, occurring from Uganda through Kenya and Malawi to northern Zimbabwe. The Zimbabwean material listed below constitutes a new record for southern Africa.

**MATERIAL.** 21♂ (1 dissected, genitalia slide L 660 (NMBZ)) and 10♀ (1 dissected, MRAC genitalia slide No. 15). 3 London (BMNH), 1 Paris (MNHN), 26 Bulawayo (NMBZ), 1 Tervuren (MRAC).

**LOCALITIES.** **Zimbabwe:** Inyanga (24); Troutbeck District, 6–7000 ft (2). **Malawi:** Lichenya Plateau, Mulanje Massive, 1800 m (1). **Kenya:** Kikuyu, Machakos to Neugia (1), Mt. Kenya, Naro Moru Track, 2300 m (1), Molo (1), Naivasha (1).

### 32. *Chiasmia rhabdophora* (Holland, 1892) comb. n.

Figs 218–220; 616, 842; 996

*Gonodela* [sic] *rhabdophora* Holland, 1892: 95.  
LECTOTYPE ♂, here designated, [Tanzania]: Zanzibar; W.L. Abbott Collector; 126; *Gonodela rhabdophora* Holl. Type; Type No. 553 U.S.N.M. (USNM) [examined].

*Gonodela* [sic] *interlineata* Warren, 1904: 478.  
Holotype ♂, **Angola**: N[orth] Bailundu, x.[19]01 [Pemberton]/8.x.[19]01; xi.478/*Gonodela* [sic] *interlineata* Warr. Type ♂; Rothschild Bequest B.M. 1939–1 (BMNH) [examined]. **Syn. n.**

*Semiothisa rhabdophora* (Holland); Swinhoe, 1904: 509; Fletcher, 1955: 90.

*Macaria rhabdophora* (Holland); Hampson, 1910: 467.

**FORE WING LENGTH.** 17–19 mm (both sexes).

**ADULT** (Figs 218–220). Ground colour of wings whitish with intense purplish-grey irroration, particular in postmedian area. All three lines usually well developed, though weaker in ♀. Discal spots present but inconspicuous. Apex of fore wing in most specimens with a greyish-white apical streak. Underside: ground colour also whitish, with coarse orange-brown irroration. Basal line present, but weak; median line irregular, more like a fascia; postmedian line fine. Postmedian area orange-brown except for four large whitish blotches near termen. Discal spots present but inconspicuous. Vestiture of thorax and abdomen largely concolorous with wings. Hind tibia of ♂ simple; setal comb on A3 absent.

**MALE GENITALIA** (Fig. 616). Uncus horns fairly small compared with size of genitalia; gnathos well developed. Costa of valve strongly curved, its termen trifurcate. Sacculus large, without particular sclerotizations. Aedeagus long and slender, vesica without cornuti. Octavals very strongly developed: entire distal margin of A8 sclerotized, octavals proper broadly bifurcate, their posterior margin hairy.

**FEMALE GENITALIA** (Fig. 842). Papillae anales fairly small. Both pairs of apophyses slender, a. posteriores about twice length of a. anteriores. Sterigma: lamella antevaginalis large, broadly rectangular; l. postvaginalis forming two elliptical, wrinkled sclerotizations above ostium. Operculum prominent, broadly triangular. Antrum short and inconspicuous. Corpus bursae elongated, flask-shaped, with a large stellate signum.

**DIAGNOSIS.** A robust species. *C. rhabdophora* is externally similar to 30. *johnstoni*, 31. *semicolor* and 112. *kilimanjarensis*. While the male genitalia of the latter species, which belongs to the *simplicilinea*-group, are markedly different in structure (Fig. 691),

*rhabdophora* can be instantly recognized by the trifurcate termen of the costa, as well as by the absence of sclerotizations on the sacculus.

DISTRIBUTION (Fig. 996). East and Central Africa (Kenya, Tanzania, Urundi, Zaire), reaching southwards through Zambia and Malawi to northern Zimbabwe. Moçambique. In southern Africa restricted to mountainous districts of eastern Zimbabwe.

BIOLOGY. The species prefers mountainous habitats. Adults were collected in January, May and July.

MATERIAL. 20♂ (2 dissected, Geometridae genitalia slide No. 16117 (BMNH); slide M. Krüger No. 23 (MNHN)) and 20♀ (1 dissected, Geometridae genitalia slide No. 16118) (BMNH). 2 London (BMNH), 2 Paris (MNHN), 4 Berlin (ZMHB), 2 Munich (ZSBS), 9 Nairobi (NMKE), 17 Bulawayo (NMBZ), 4 C. Herbulot collection.

LOCALITIES. **Zimbabwe:** Harare (Salisbury) (2), Inyanga (3), Brandesbury Park, Lower Inyanga (1), Vumba (7). **Malawi:** Bvumbwe Exp[erimental] Sta[tion], Limbe (2), Nyika Plateau (1). **Zambia:** Abercorn, Mbala (4), Sakeji School/Mwinilunga (1). **Moçambique:** Furankunga (1). **Urundi:** Kitega (1). **Kenya:** Nyeri, 6500 ft., Chania River Camp (1), Isiolo (1). **Tanzania:** Kigoma env. (2), Vjamba Forest, Kungwe (5), Kipengere Range, Ikonda 2050 m (2), Victoria-Nyansa, Sesse-Inseln (2), N. Lake Nyassa, Paroto-Rungwe Mission (1), N. Lake Nyassa, Rungwe-Langenburg (1). **[Zaire]:** (Belgian Congo), Kitembo, Lake Kivu region (1). **Central Africa:** no further data (1).

### 33. *Chiasmia nobilitata* (Prout, 1913) comb. n.

Figs 221, 222; 617, 843; 996

*Macaria nobilitata* Prout, 1913: 216. Holotype ♀, [South Africa, Mpumalanga]: Sabie, Transvaal, Dec[ember] 1911 (W. Grubb); L.B. Prout Coll. B.M.1939-643; *Macaria nobilitata* Prout ♀ type, Ann[als] [of the] Tr[an]sv[aa]l Mus[eum] iii.216 (Jan[uary] 1913); Rothschild Bequest B.M.1939-1 (BMNH) [examined]. Paratypes (2♂, 3♀). **[South Africa]:** 1♀, coll. J.A.C.; *Macaria nobilitata* Prout cotype; L.B. Prout Coll. B.M.1939-643. 2♂, 2♀, Transvaal, Piet Retief (R. Crawshay), 1903.-314, dated 30.viii.1903 (1♂, 2♀), 8.xi.1903 (♀) (BMNH) [examined].

*Macaria nobilitata* Prout; Janse, 1917: 114.

*Semiothisa nobilitata* (Prout); Janse, 1932: 232.

FORE WING LENGTH. 16-18 mm (♂), 16-19 mm (♀).

ADULT (Figs 221, 222). Ground colour of wings whitish, densely striated with purplish-grey, especially postmedian area. Basal and median lines weakly to well

developed, postmedian line always well developed and clear. Discal spots present, purplish-grey. Underside: also whitish, but striation coarser, grey and yellow, giving a mottled appearance. In darker specimens postmedian area wholly greyish-orange. Discal spots and postmedian line present, no other markings developed. Vestiture of body concolorous with wings. Hind tibia of ♂ not modified. Setal comb on A3 absent.

MALE GENITALIA (Fig. 617). Uncus broad, horns rather small; gnathos well developed, rounded. Valva long and narrow; costa with broad ventral process; sacculus small. Aedeagus long and fusiform, apically pointed. Vesica without cornuti. Octavals hairy, very strongly sclerotized, extending over entire distal margin of A8.

FEMALE GENITALIA (Fig. 843). Papillae anales elongated and narrow. Both pairs of apophyses thin and fairly long. Sterigma with somewhat crescentic l. antevaginalis. Bursa copulatrix tubular; antrum and anterior portion of ductus bursae short, corpus bursae long and of roughly equal width throughout. Signum medium-sized, stellate.

EARLY STAGES. Unknown, but see under BIOLOGY.

DIAGNOSIS. Externally, this species is similar to 112. *C. kilimanjarensis*, which, however, has the termen of the hind wing more strongly attenuated at M3, and the postmedian line on the fore wing more acutely angled below the apex. Also, the lines are usually more strongly developed in *nobilitata*. There is also some resemblance to 32. *C. rhabdophora*; the differences in the genitalia are evident from the illustrations (compare Figs 616, 617 and 842, 843).

BIOLOGY. The species is associated with mountainous habitats and is most numerous late in the season, from January to April and in July; however, single specimens were collected in September. In Swaziland, the foodplant is probably a low species of *Entada* (N.J. Duke, *pers. commun.* and personal observation).

DISTRIBUTION (Fig. 996). Mountainous parts of the eastern Transvaal in South Africa and Swaziland.

MATERIAL. 30♂ (1 dissected, TM genitalia slide No. 10865) and 18♀ (1 dissected, TM genitalia slide No. 10866). 35 Pretoria (TM), 11 N.J. Duke collection, 1 D.M. Kroon collection, 1 H.S. Staude collection.

LOCALITIES. **South Africa, Transvaal:** [Gauteng]: Pretoria (1). [Mpumalanga]: Waterval Onder (1), Barberton (1), Kalkoenkrans (1), Lydenburg (5), Stoffberg, Middelburg District (1), Ngodwana (2). [Northern Province]: Woodbush (2), Mount Sheba (2), Mariti Forest (1). **Swaziland:** Miller's Falls (1), Sidwashini (4), Mbabane, Malagwane Hill (1), Malolotja (24), Bulembu (1).

## 6. *Chiasmia infabricata*-group

This is a small group of three species which are rather closely related to the species of the *amarata-* and *aestimaria*-groups, below. Autapomorphies defining the *infabricata*-group include the spatulate, rounded costa; the meandering, sclerotized band on the sacculus of the male, and the peculiar, 'horned' antrum in the female genitalia. Distribution of members of this group is somewhat disjunct, one (36. *C. nevilledukei*) being endemic to Zimbabwe, while the others are restricted to West (35. *C. adelpha*) and eastern Africa (34. *C. infabricata*), respectively.

**MALE GENITALIA** (Figs 618–620). Uncus horns medium-sized; gnathos weak. Valves ample; costa slightly recurved, widening to form a spatula; sacculus rounded or somewhat pointed, with an-s-shaped, sclerotized band. Aedeagus heavily sclerotized, subcylindrical and truncated anteriorly; vesica with or without cornuti. Octavals large, arcuate.

**FEMALE GENITALIA** (Figs 844, 845). Papillae anales variable, pointed or rounded; apophyses not strong. Sterigma not particularly modified. Antrum large, greatly developed to form apical sclerotizations resembling a bull's horns. Bursa copulatrix pear-shaped and membranous except for posterior section of ductus which appears ribbed. Signum circular, with short spicula.

## Key to species

- 1 Moths with upperside of wings markingless except for prominent postmedian (Fig. 227). ♂ genitalia (Fig. 620) with octavals very prominent, tips closer together than in other species. ♀ unknown. Eastern Zimbabwe (Vumba Mts).....  
..... 36. *nevilledukei* sp. n., p. 150
- Moths differently marked (Figs 223–226). ♂ genitalia (Figs 618, 619) not as above, ♀ genitalia as in Figs 844, 845. One species restricted to Cameroon, one species more widely distributed, including eastern Zimbabwe .....
- 2(1) Moths weakly marked (Figs 223–225). ♂ genitalia (Fig. 618) with rounded spatula; octavals very large. ♀ genitalia (Fig. 844) with antrum hypertrophied; bursa copulatrix comparatively slender. Eastern and southern Africa, distributed from Uganda and Rwanda to Zimbabwe .....
- ..... 34. *infabricata* (Prout), p. 149
- Moths with well developed markings (Fig. 226). ♂ genitalia (Fig. 619) with margin of spatula concave; octavals smaller. ♀ genitalia (Fig. 845) with antrum large but not as hypertrophied; bursa copulatrix large, broadly rounded. Cameroon .....
- ..... 35. *adelpha* sp. n., p. 150

## 34. *Chiasmia infabricata* (Prout, 1934) comb. n.

Figs 223–225; 618, 844; 997

*Semiothisa infabricata* Prout, 1934a: 129. Holotype ♂, [Malawi]: (Nyassaland), 2.21, Zomba Plateau, November 1920 (H. Barlow); Sem. 157 on [undecipherable]; Joicey Bequest B.M.1934–120; *Semiothisa infabricata* Prout ♂ type (BMNH) [examined]. Paratypes: see Remarks

**FORE WING LENGTH.** 14–16 mm (both sexes).

**ADULT** (Figs 223–225). Ground colour ochreous to greyish brown, speckled with grey. Wings broader in ♀; hind wings of both sexes without 'tail'. Lines well developed to nearly reduced, median line usually wider and less clearly defined, more like a fascia. Discal spots very weakly developed or absent. Postmedian area darker, particularly in the ♀, where frequently several fairly large dark spots are present. Underside: ground colour in fresh examples a rich chocolate brown, mixed with white, particularly on hind wing. Thorax and abdomen ochreous. Hind tibia of ♂ not modified. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 618). Uncus horns well developed; gnathos delicate. Cleft between costa and sacculus very deep; spatula short and stout, sacculus very large, both well rounded. Aedeagus massive, somewhat truncated anteriorly. Vesica bearing a short, rod-like apical cornutus and exhibiting some subapical striations; in addition, a small apical process present on aedeagus. Octavals very large, between furcate and arcuate in shape.

**FEMALE GENITALIA** (Fig. 844). Papillae anales rather small, slender. Both pairs of apophyses delicate, a. anteriores about two-thirds length of a. posteriores. Sterigma simple. Antrum complex and heavily sclerotized, one large pair of horn-like processes pointing posteriorly and a smaller pair directed laterally present. Corpus bursae pear-shaped. Ductus bursae ribbed posteriorly, corpus membranous throughout. Signum medium-sized, rounded.

**DIAGNOSIS.** In facies not unlike a species of *Isturgia*. Confusion is possible with *C. adelpha*, below, from which it can be separated by the presence of a broad, chocolate brown-and-white fascia on the underside of the wings; *C. infabricata* is also more ochreous, with broader wings. The differences in genitalic structure are evident from the illustrations (compare Figs 618, 619 and 844, 845).

**BIOLOGY.** *Chiasmia infabricata* is associated with subtropical and tropical montane forests. Adult specimens were collected in October, February and April.

**DISTRIBUTION** (Fig. 997). Eastern and southern Africa, from Uganda and Rwanda to Zimbabwe. The Zimbabwean specimens listed below constitute a new record for southern Africa.

MATERIAL. 19♂ (3 dissected, TM genitalia slides No. 11020, 11032, 11034) and 445 (2 dissected, TM genitalia slide No. 11033; genitalia slide M. Krüger No. 21). 1 London (BMNH), 1 Paris (MNHN), 4 Bulawayo (NMBZ), 28 Pretoria (TM), 19 Nairobi (NMKE), 2 C. Herbulot collection, 9 N.J. Duke collection.

LOCALITIES. **Zimbabwe:** Honde Valley, Aberfoyle (29), Mt. Selinda (7), Risu River/Melsetter (1), Laurenceville, Vumba Mts (1), Bunga Forest, Vumba (1). **Malawi:** Zomba Plateau, Kuchawe Inn, 1600 m (1), Mt. Mlanje, Lujeri Tea Estates (2). **Tanzania:** Kabira Forest, Ruanda Distr., 12 m N. of Usumbura, N. end Lake Tanganyika (1). **Uganda:** Kayonza, Kigezi (2), Mpanga Forest, Fort Portal (3), Kalinzu Forest, Ankole (3), Kibale Forest, Toro (6), Impenetrable Forest, Kigezi (6). **Kenya:** Kilimanjaro, Kiboscho, 1400 m (1). **Rwanda:** SW., Nyungwe Village, 2000 m (1).

REMARKS. The ♂ and ♀ paratype from Mt. Mlanje mentioned in the original description could not be traced in BMNH.

### 35. *Chiasmia adelpha* sp. n.

Figs 226; 619, 845

TYPE MATERIAL. Holotype ♂, **Cameroon:** Forêt de Bafut Nguemba, 7,5 km S.E. de Bamenda, 2230 m, 4.IV.1972 (C. Herbulot); Pr[éparation] No. 6867 C. Herbulot (C. Herbulot collection). Paratypes (4♀). **Cameroon:** 3♀, Forêt de Bafut Nguemba, 9 km SE de Bamenda, 2080 m, 3 au 5.IV.1972 (C. Herbulot), Pr[éparation] No. 6868 C. Herbulot; 1♀, Préfecture de Kumbo, 5 km E de Oku, 2120 m, 8 et 9.IV.1972 (C. Herbulot) (C. Herbulot collection).

FORE WING LENGTH. 14 mm (both sexes).

ADULT (Fig. 226). Of medium size. Antennae ciliate, shaft thicker in ♂. Termen of hind wing crenulated, without a tail proper. Ground colour of wings whitish, densely suffused with ochreous-grey and with darker grey irroration, more prominent in ♀; postmedian area only slightly darker. All three lines present but very faint, postmedian angled at about 120° below costa of fore wing. Three dark maculae present where lines meet costa of fore wing. Discal spots inconspicuous. A prominent dark macula in postmedian area of fore wing, level with cell. Preapical spot present but faint in ♂. Underside: much more variegated in ♀. Basal area of fore wing whitish-grey, almost without markings; other areas pure white with coarse sepia irroration and several blotches; discal spots absent on fore wing, well developed on hind wing. Vestiture of thorax and abdomen ochreous-grey, interspersed with darker scales. Hind tibia of ♂ not dilated. Setal comb on A3 absent.

MALE GENITALIA (Fig. 619). Uncus horns well

sclerotized; gnathos normal. Valve short and massive. Costa spatulate, appearing somewhat truncated. Sacculus somewhat angular. Aedeagus well sclerotized, cleft apically; vesica with a single, needle-like median cornutus. Octavals large and furcate, tips directed outwards.

FEMALE GENITALIA (Fig. 845). Papillae anales rounded, appearing swollen. Both pairs of apophyses short and very thin, a. anteriores between one-third and half length of a. posteriores. Sterigma not particularly modified. Antrum well sclerotized, forming a conspicuous pair of horn-like sclerotizations. Bursa copulatrix pyriform, membranous except for posteriormost part of ductus bursae, which is strongly sclerotized on one side. Signum small, nearly circular.

DIAGNOSIS. The only similar species is *C. infabricata*, above. Apart from being allopatric, *C. adelpha* is brownish-grey rather than ochreous in appearance and lacks the brown postmedian fascia on the underside.

BIOLOGY. The species occurs in afromontane forest above 2000 m, possibly as a relic. Adults have been collected in April.

DISTRIBUTION. Only known from a single locality in the Bamenda area of Cameroon.

ETYMOLOGY. From Greek ἀδελφός, δ, a brother; the species is closely related to *C. infabricata*.

### 36. *Chiasmia nevilledukei* sp. n.

Figs 227; 620; 997

TYPE MATERIAL. Holotype ♂, **Zimbabwe:** Laurenceville, Vumba, 10.-15.10.[19]90 (N.J. Duke); TM Lep[idoptera] Het[erocera] Genitalia slide No. 11184 (TM).

FORE WING LENGTH. 14 mm (♂ holotype).

ADULT ♂ (Fig. 227). Ground colour of wings whitish, densely irrorated with ochreous, and, to a lesser extent, with black. Basal line weakly developed on fore wing, absent on hind wing; median line virtually absent, but postmedian well developed and prominent on both wings. Discal spots inconspicuous on fore wing, well developed on hind wing. Apart from lines wings unicolorous. Underside whitish-ochreous with fine blackish striations; discal spots visible only on hind wing; postmedian line reasonably well developed, other lines absent. Vestiture of thorax and body greyish-ochreous. Hind tibia of ♂ simple. Setal comb on A3 absent.

MALE GENITALIA (Fig. 620). Uncus horns and gnathos medium-sized. Valva short and stout, costa well rounded apically and forming a distinct spatula;

sacculus large and rounded, with a small apical sclerotization only. Aedeagus nearly cylindrical, slightly widening towards the cleft tip, well sclerotized. Vesica with some faint apical denticles. Octavals large and well sclerotized, arcuate.

**DIAGNOSIS.** Similar externally to certain specimens of *C. brongusaria* (*brongusaria*-group), although slightly less robust and smaller. From the other members of the *C. infabricata*-group, *nevilledukei* may be separated by the reduction of wing markings on both sides. The differences in ♂ genitalic structure are evident from the illustrations (compare Figs 618–620 and 716).

**DISTRIBUTION** (Fig. 997). Vumba Mountains of eastern Zimbabwe.

**BIOLOGY.** The unique holotype was collected in October in a savanna habitat at ca. 1400 m altitude.

**ETYMOLOGY.** Named in honour of the collector of the holotype, the late Neville J. Duke.

## 7. *Chiasmia trirecurva*-group

A large group, comprising 21 small to rather large, but mostly medium-sized ochreous, greyish or brownish species. The hind wing is slightly attenuated at M<sub>3</sub>, thus forming a little 'tail'. The antennae are ciliate in both sexes, though slightly thicker in the male. Members of the *trirecurva*-group are universally distributed throughout the Afrotropical region and are frequently associated with the forest biome; hence, the rain forests of western and central Africa and eastern Madagascar are richest in species.

Members of the *trirecurva*-group share the following apomorphies: (i) a spatulate costa; (ii) arcuate, frequently pointed octavals in the male genitalia; (iii) a shell-shaped antrum and (iv) an elongated, pyriform bursa copulatrix in the female genitalia.

**MALE GENITALIA** (Figs 621–641). Uncus horns strongly developed; gnathos elongated but slender. Valves characterised by the usually large, somewhat triangular spatulate costa; sacculus typically small, rounded and unarmed. Aedeagus small relative to size of genitalia, somewhat fusiform; vesica in most species bearing a single, rod-like apical or median cornutus plus a group of microcornuti or denticles near apex. Octavals typically broadly emarginate (furcate).

**FEMALE GENITALIA** (Figs 846–866). Papillae anales small; apophyses thin. Sterigma: lamella antevaginalis not or hardly modified; l. postvaginalis forming mostly quite small sclerotizations on sides of antrum. Antrum broadly funnel- or shell-shaped. Bursa copulatrix typically with a long, sclerotized ductus and elongated corpus bursae with a large stellate signum; spicula of signum moderately long.

## Key to species

- 1 Fore wing with straight postmedian line ..... 2
- Fore wing with postmedian line discontinuous or angled below costa ..... 4
- 2(1). Moths light to olivaceous brown (Figs 239–241); the Madagascan ssp. *conjugata* (Herbulot) much lighter, ochreous. ♂ genitalia (Fig. 627) with octavals as illustrated. ♀ genitalia as in Fig. 852. Widely distributed in Afrotropical region, including Madagascar ..... 43. *separata* (Warren), p. 158
- Moths olivaceous (Figs 242–245). ♂ and ♀ genitalia as in Figs 628, 629 and 853, 854. Endemic to Madagascar ..... 3
- 3(2) Moths dirtyish grey-and-olive (Figs 242–244), wings relatively broad. ♂ genitalia (Fig. 628) with sacculus squarish; octavals broad, with tips pointing outwards. ♀ genitalia (Fig. 853) as illustrated. Madagascar ..... 44. *livorosa* (Herbulot), p. 159
- Moths paler, more olivaceous (Fig. 245), wings narrower. ♂ genitalia (Fig. 629) with sacculus rounded; octavals narrower, tips approximately parallel. ♀ genitalia (Fig. 854) as illustrated. Madagascar ..... 45. *neolivorosa* sp. n., p. 160
- 4(1) Large, sombre moths (fw length 16–18 mm) with faintly angled fore wing postmedian (Figs 269–271). ♂ genitalia (Fig. 641) with long valvae and slender spatula; aedeagus with single, fairly large median cornutus; octavals acutely pointed. ♀ genitalia (Fig. 866) with cleft ductus bursae ..... 57. *feraliata* (Guenée), p. 168
- Moths differently coloured but always smaller. ♂ and ♀ genitalia not as in Figs 641 and 866 ... ..... 5
- 5(4) Small (fw length 11–14 mm), yellowish or pale ochreous species (Figs 246, 247, 250–252) or moths ochreous with dark suffusion in postmedian area (Figs 253, 254, 258, 259) ..... 6
- Larger (fw length 12–16 mm), brown or grey species (Figs 228–238, 248, 249, 255–257, 260–268) ..... 11
- 6(5) Pale species with indistinct interneurals (Figs 246, 247) ..... 7
- Vividly yellowish or ochre species with prominent interneurals (Figs 250–254, 258, 259) .. 8
- 7(6) Very pale (Fig. 246); postmedian line indistinct but on fore wing accompanied by some blackish maculation. Underside of fw without dark scales along costa. ♂ and ♀ genitalia as illustrated (Figs 630, 855) ..... 46. *parallacta* (Warren), p. 161
- Vividly ochreous (Fig. 247); postmedian line

- also indistinct but lacking dark maculation. Underside of fw with dark scales along costa. ♂ and ♀ genitalia as illustrated (Figs 631, 856) .... ..... 47. *paucimacula* sp. n., p. 161
- 8(6) Moths with well developed markings (Figs 250, 251) ♂ genitalia (Fig. 633) with broad, rounded spatula. ♀ genitalia as in Fig. 858. KwaZulu-Natal coast; few records from further inland .... ..... 49. *natalensis* (Warren), p. 163
- Moths similar but mostly with rather fainter markings. ♂ genitalia (Figs 634, 635, 637) with narrower, pointed spatula. ♀ genitalia as in Figs 859, 860, 862. West Africa and Madagascar .... ..... 9
- 9(8) Moths with very light markings (Fig. 252). ♂ genitalia (Fig. 634) with octavals as illustrated. ♀ genitalia as in Fig. 859. Madagascar ..... ..... 50. *coronoleucas* (Prout), p. 163
- Moths with heavier markings or dark suffusion on upperside (Figs 253, 254; 258, 259). ♂ genitalia with octavals not as above. ♀ genitalia similar but not as in Fig. 859. African mainland .... ..... 10
- 10(9) Moths similar to *C. natalensis*, above, but slightly darker (Figs 253, 254). ♂ and ♀ genitalia as in Figs 635, 860; octavals furcate. West Africa .... ..... 51. *fontainei* (Fletcher), p. 164
- Moths with dark suffusion on upperside of wings (Figs 258, 259). ♂ and ♀ genitalia as in Figs 637, 862; octavals arcuate. Similar to 50. *C. conturbata*, below, but genitalia different (Figs 638, 863). West Africa ..... ..... 53. *crumenata* (Fletcher), p. 165
- 11(5) Delicate moths (fw length 13–14 mm), greyish-brown with prominent preapical spot; termen of fore wing emarginate below apex (Figs 248, 249). ♂ genitalia (Fig. 632) with short and rounded costa and sacculus and very short, apically cleft aedeagus. ♀ genitalia as in Fig. 857. Uganda; Ruwenzori ..... ..... 48. *phaeostigma* (Fletcher), p. 162
- Moth mostly larger; if greyish-brown with prominent preapical spot then apex of fore wing not emarginate. ♂ and ♀ genitalia not as in Figs 632 and 857. Widely distributed in study area ..... ..... 12
- 12(11) Predominantly brown species (Figs 233–238, 255–257, 260–262) ..... ..... 13
- Greyish or ochreous species (Figs 228–232, 263–268) ..... ..... 17
- 13(12) Very dark, blackish brown moths (Figs 255–257) with wavy darker lines across both wings. ♂ and ♀ genitalia as in Figs 636, 861; octavals with rounded tips; sterigma forming two recurved processes ..... ..... 52. *threnopis* (Fletcher), p. 165
- Paler moths (Figs 233–238, 260–262). ♂ and ♀ genitalia not as in Figs 636, 861 ..... ..... 14
- 14(13) Fairly variable moths, resembling *C. crumenata*, above (Figs 260–262). ♂ genitalia as in Fig. 638, ♀ genitalia (Fig. 863) with relatively long antrum and very long signum. West and central Africa to Uganda ..... ..... 54. *conturbata* (Warren), p. 166
- Usually paler, greyish rather than brown moths (Figs 233–238). ♂ and ♀ genitalia not as in Figs 638, 863. Widely distributed in study area ..... ..... 15
- 15(14) Hind wing practically without tail; moth resembling 104. *C. lindemannae* in facies (Figs 237, 238). ♂ genitalia (Fig. 626) with slender costa; aedeagus bearing single large cornutus; octavals pointed. ♀ genitalia as in Fig. 851. Uganda and Rwanda ..... ..... 42. *flavicuneata* (Herbulot), p. 157
- Evenly brown moths with tailed hind wings (Figs 233–236); ♂ (Figs 624, 625) and ♀ genitalia (Figs 849, 850) not as above ..... ..... 16
- 16(15) ♂ genitalia (Fig. 624) with short and stout aedeagus, bearing a single, large, elliptical cornutus. ♀ genitalia (Fig. 849) with evenly rounded antrum. Widely distributed in West Africa, extending to south-east Zimbabwe ..... ..... 40. *fuscataria* (Möschler), p. 156
- ♂ genitalia (Fig. 625) with slender, spindle-shaped and apically cleft aedeagus. ♀ genitalia (Fig. 850) with broad, somewhat pointed antrum. Madagascar ..... ..... 41. *malgassofusca* sp. n., p. 157
- 17(12) Ochreous to light brown moths with ochreous underside (Fig. 232); a rare variation with underside as in 36. *confuscata*. ♂ genitalia (Fig. 623): aedeagus with a long, slightly twisted cornutus and an apical group of fairly large microcornuti. ♀ genitalia as in Fig. 848. South Africa to Kenya, rare in north ..... ..... 39. *sororcula* (Warren), p. 155
- Greyish-brown or greyish species; underside not ochreous (Figs 228–231, 263–268). ♂ and ♀ genitalia not as in Figs 623, 848. Widely distributed ..... ..... 18
- 18(17) Underside of fore wing with faint yellowish suffusion along costa. Adults as in Figs 263–268 ..... ..... 19
- Underside of fore wing without such suffusion. Adults as in Figs 228–231 ..... ..... 20
- 19(18) ♂ genitalia (Fig. 639) with valvula present; aedeagus not cleft apically; octavals with tips directed outwards. ♀ genitalia (Fig. 864) with extensive sterigma. KwaZulu-Natal to Kenya; Cameroon ..... ..... 55. *inquinata* sp. n., p. 167
- ♂ genitalia (Fig. 640) lacking valvula; aedeagus deeply cleft; octavals with tips parallel or directed

- slightly inwards. ♀ genitalia (Fig. 865) also with well-developed sterigma. Madagascar .....  
..... 56. *insulicola* sp. n., p. 168
- 20(19) Moths variable, greyish-brown to fairly dark grey (Figs 229–231). ♂ genitalia (Fig. 622): aedeagus with a long, poorly sclerotized, weak cornutus and some apical denticles (microcornuti). ♀ genitalia (Fig. 847) with relatively small sterigma. South Africa to Uganda, but rare in northern part of its range .....  
..... 38. *confuscata* (Warren), p. 153
- Pale, greyish-brown moths (Fig. 228). ♂ genitalia (Fig. 621): aedeagus with a shallow apical cleft, vesica with a long, well sclerotized twisted cornutus and an apical group of denticles (microcornuti). ♀ genitalia (Fig. 846) with sterigma larger than in above species. Madagascar .....  
..... 37. *trirecura* (Saalmüller), p. 153

### 37. *Chiasmia trirecurva* (Saalmüller, 1891)

comb. n.

Figs 228; 621, 846

*Macaria trirecurva* Saalmüller, 1891: 497.  
LECTOTYPE ♀, here designated, [Madagascar]: [Nossi-Bé], *Macaria trirecurva* n.5, 263, Sn. 75.76; Typus/Lep[ido]ptera] 446 [obliterated] 2725 (Acronym); SMF L 2725; genitalia slide No. 585 (SMF) [examined]. Paralectotype (1♂). [Madagascar]: [Nossi-Bé], Paratypoid/Lep[ido]ptera] 446a [obliterated] 2725a (Acronym); SMF L 2725a; genitalia slide No. 586 (SMF) [examined].

*Azata trirecurva* (Saalmüller); Warren, 1897a: 105.  
*Semiothisa trirecurva* (Saalmüller); Janse, 1932: 211  
(as a synonym of *S. duplicitinea* (Warren)); Herbuleot, 1956: 248.

FORE WING LENGTH. 12–13 mm (♂), 11–12 mm (♀).

ADULT (Fig. 228). Of medium size. Fore wing narrower in ♂; tail on hind wing not pronounced. Ground colour of wings whitish, with profuse light greyish-brown irroration and suffusion, notably in postmedian area. Basal and median absent or nearly so, postmedian better developed but very fine, angled below costa of fore wing. Discal spots faint, greyish-brown on fore wing and blackish on hind wing. Underside similar, but markings more pale orange brown. Vestiture of thorax and abdomen concolorous with wings. Hind tibia of ♂ dilated and exhibiting groove on inner side; no hair-pencil evident. Seta comb on A3 present.

MALE GENITALIA (Fig. 621). Uncus with strongly developed horns; gnathos slender, deeply emarginate. Costa of valve forming a slender spatula; sacculus somewhat rounded, not much wider than costa and

exhibiting distinctly sclerotized inner margin. Aedeagus rather small, spindle-shaped and cleft apically; vesica with a long, twisted median cornutus and a fairly extensive band of denticles in posterior region. Octavals small, furcate to arcuate, with rounded tips.

FEMALE GENITALIA (Fig. 846). Papillae anales pointed. Both pairs of apophyses rather thin, a. anteriores about two-thirds length of a. posteriores. Sterigma with l. antevaginalis well developed, showing some short, sclerotized transverse ridges. Antrum shell-shaped, prominent. Bursa copulatrix elongated, membranous part of ductus equaling corpus in length. Posterior section of ductus ribbed, studded with minute denticles. Corpus bursae tear-shaped, with large signum.

DIAGNOSIS. This species is very closely related to the variable 38. *C. confuscata*, below, though somewhat less densely irrorated, thus appearing more whitish. The male genitalia show small differences in the arrangement of cornuti on the vesica and the shape of the octavals; in the female, the sterigma is somewhat larger in *C. trirecurva*. As the two species are allopatric, however, no confusion should occur.

BIOLOGY. The species is associated with rainforest areas in the east of Madagascar. Adults have been collected from December to January.

DISTRIBUTION. Madagascar, with most records from the eastern parts of the island.

MATERIAL. 2♂ (1 dissected, Geometridae genitalia slide No. 2094) (BMNH) and 2♀ (1 dissected, Geometridae genitalia slide No. 17547) (BMNH). 4 London (BMNH)

LOCALITIES. **Madagascar:** Nanisana nr. Tananarivo (2), Station Perinet (2).

### 38. *Chiasmia confuscata* (Warren, 1899) comb. n.

Figs 229–231; 622, 847; 998

*Semiothisa confuscata* Warren, 1899b: 308.  
LECTOTYPE ♂, here designated, [Uganda]: Warringo R[iver], Unyoro, 3.[or 8.] vii. [18]97 (Dr. Ansorge); Rothschild Bequest B.M.1939.1–1; vi.308/  
*Semiothisa confuscata* Warr. Type ♂; Geometridae genitalia slide No. 2095 (BMNH) [examined]. Paralectotypes (10♂). [Uganda]: Warringo R[iver], 8.vii.(1), 11.xii.(2), Wakibara, 24.xi.(5), 23.vii.(1). Mueni, 6.v. (1) (BMNH) [examined].

[*Macaria trirecrurata* Saalmüller; Swinhoe, 1904: 507 (mis-spelling of *trirecura* Saalmüller). Misidentification.]

*Macaria hypoleuca* Prout, 1916a: 174. Holotype ♂, [South Africa]: [KwaZulu-Natal], New Hanover, Hardenb[erg], VIII [19]13, Coll. Janse/*Macaria hypoleuca* Prout, Type No. 2210 (TM genitalia slide

No. 10885) (TM) [examined]. **Syn. n.** Paratypes (2♂). 1♂, [Zambia]: (North-Eastern Rhodesia), Niamadzi River, near Nawalia, 2000 ft, 20.VIII.1910 (S.A. Neave) (BMNH). 1♂, North-Eastern Rhodesia, Upper Luango River, betw. Luvumbu and Mwalesi Rivers, 09.VIII.1909 (S.A. Neave) (BMNH) [examined].

*Macaria confuscata* (Warren); Janse, 1917: 113.

*Macaria hypoleuca* Prout; Janse, 1917: 113; Fletcher, 1958a: 137; 1978a: 81 [as synonym of *Semiothisa trirecurva sororcula*].

[*Macaria trirecurva* Saalmüller; Janse, 1917: 114. Misidentification.]

*Semiothisa hypoleuca* (Prout); Janse, 1932: 231.

*Semiothisa confuscata* Warren; Janse, 1932: 212 (partim); 1933–35: 439.

*Semiothisa trirecurva confuscata* Warren; Fletcher, 1955: 90 (as comb. n.).

FORE WING LENGTH. 12–15 mm (♂), 11–16 mm (♀).

**ADULT** (Figs 229–231). A medium-sized species, rather variable in coloration. Tail on hind wing short. Ground colour of wings chalk white, densely suffused and irrorated with greyish brown to dark grey, or, rarely, with leather brown; males on average darker. Basal and median lines nearly absent to moderately well developed, postmedian line also usually faint, but comparatively clear. Discal spots present but mostly inconspicuous. Postmedian area of fore wing frequently with a dark blotch. Underside whitish with intense, very fine brownish striation. Postmedian area suffused with greyish brown except for pale blotches on apex and near tornus of fore wing and near anal angle of hind wing. Discal spots present, inconspicuous to prominent; median line mostly present as a narrow fascia. Vestiture of thorax and abdomen concolorous with wings, paler on underside. Hind tibia of ♂ dilated, grooved on inner side but lacking hair-pencil. Setal comb on A3 present. *Variation.* Pale, leathery brown examples with a darker brown postmedian area and a strong contrast between basal/median and postmedian area occur occasionally and were originally described as *Macaria hypoleuca* Prout.

**MALE GENITALIA** (Fig. 622). Uncus horns and gnathos rather large. Costa of valve elongated, forming a distinct spatula. Sacculus well developed, fairly well rounded. Aedeagus small and rather stout, broadening towards apex. Vesica bearing a small, needle-like cornutus and exhibiting an extensive spinose area close to the tip. Octavals forked, fairly small.

**FEMALE GENITALIA** (Fig. 847). Papillae anales medium-sized. Both pairs of apophyses slender, a. anteriores more than two-thirds length of a. posteriores. Sterigma: l. antevaginalis broadly crescentic; l. postvaginalis small and inconspicuous. Antrum small, cylindrical to shell-shaped. Bursa copulatrix elongated,

with long, posteriorly sparsely ribbed ductus, gradually widening into the membranous corpus. Signum medium-sized, stellate. Wall of bursa around signum bearing minute denticles.

**DIAGNOSIS.** Variable and very closely related to *C. trirecurva* which, however, is confined to Madagascar. While rather distinct in underside markings, *C. sororcula*, below, is very much like *trirecurva* and *confuscata* in male and female genitalia structure; the diagnostic characters are given in the diagnosis for *C. sororcula*. Another similar species is 40. *C. fuscataria*; for the differences in genitalia and habitus, see under that species, below.

**BIOLOGY.** The species occurs in a wide range of habitats, including savanna of varying humidity and coastal lowland forest. It occasionally occurs in high numbers in the cold mist forests of KwaZulu-Natal (e.g., Ngome Forest, 27°48'S 31°25'E). In southern Africa, adults have been observed from January to May and from September to December.

**DISTRIBUTION** (Fig. 998). Ranging from East Africa (Uganda, Kenya, Tanzania) and Zaire to Cape Province. In southern Africa widely distributed east of 27°E. Records from West Africa probably refer to related species, in particular *C. fuscataria*.

**MATERIAL.** 132♂ (8 dissected, TM genitalia slides No. 969, 10830, 10839, 10887, 10892, 10906, 11269; Staude collection genitalia slide No. 3) and 171♀ (10 dissected, TM genitalia slides No. 10831–32, 10840, 10888–90, 10893, 10896, 10899, 10900). 2 London (BMNH), 1 Munich (ZSBS), 31 Bulawayo (NMBZ), 227 Pretoria (TM), 2 Cape Town (SAM), 19 N.J. Duke collection, 21 H.S. Staude collection.

**LOCALITIES.** **South Africa, Transvaal:** [North-West]: Rustenburg (26), Buffelspoort, Magaliesberg (2). [Northern Province]: Rietvlei (1), Cyprus Farm/Oefolaco (1), Mahuba's Kloof (8), Louis Trichardt (10), Blouberg (2), Soutpansberg, Wylie's Poort (4), Entabeni Forest (2), Buzzard Mountain Retreat (8). Blyde River Nature Reserve (3), Klein Sand River Valley, 30 km N. Nylstroom (1), Malta, Ptbg. (7), Mt. Sheba (1), De Hoek Forestry (1), Mariepskop (34), Ohrigstad (1), Graskop (1), Mariti Forest (3); Kruger National Park: Satara (4). [Mpumalanga]: Pilgrim's Rest (5), Kowyn's Pass (1), Waterval Boven (8), Ngodwana (8), Nelspruit, 800 m (3), Nelspruit Nature Reserve (5), Laersdrif, Middelburg District (2), Nelshoogte (4), Uitsoek (10), Berlin Forestry (3), Barberton (11), Bergvliet Forestry, Sabie Distr. (2), Kalkoenkrans 10 km E. Carolina (1). **KwaZulu-Natal:** Ngome (20), Nkandla Forest (2), Pinetown (1), Maphalana (1), Mkuze (2), Pietermaritzburg (1), Karkloof (2), Hlabeni Mist Forest, Creighton, 1500 m (2) Yellowwoods, Balgowan (3), Mbona (2), Sarnia

(13), New Hanover (1), Gwaliweni, Ingwavuma District (1). **Cape Province:** [Eastern Cape]: The Haven (14), Port St. John's (2), Umgazi River Mouth (2), Emboyi Forest (1). **Swaziland:** Mbabane, Malagwane Hill (9). **Zimbabwe:** Dichwe Forest (1), Bubye River (1), Vumba (5), Mt. Selinda (2), Khami, Matabeleland (3), Harare (5), 96 m SE. Nuanetsi (2), Victoria Falls (1), Chikwarakwara Base Camp (6). **Moçambique:** Salone River Forest, Marromeu (1), Chiluvo Hills (6), Lutope Tin Mine, Zambezi Valley (1), Dondo (1). **Kenya:** Makindu, S. of Nairobi (1), Kibwezi (1). **Tanzania:** Usambara Mts., Sakarani, 1500 m (1), Amani, E. Usambara (1). **Uganda:** Zika Forest, Entebbe (2).

**REMARKS.** (i) The original description of *S. confuscata* was based on 25 syntypes, of which 11 have been located in the collections of the BMNH. (ii) Janse's (1932) illustration of the male genitalia of *confuscata* (TM genitalia slide No. 962) in reality depicts the genitalia of a specimen of *C. inquinata* sp. n., below. This specimen was included as a paratype in the description of that species.

### 39. *Chiasmia sororcula* (Warren, 1897) comb. n.

Figs 232; 623, 848; 999

*Azata sororcula* Warren, 1897a: 105. Holotype ♀, [Malawi]: Zomba, Upp[er] Shiré distr[ict], iv.v [18]95 (Dr. P. Rendall); iv 105/*Azata sororcula* Warr. Type ♀ (BMNH) [examined].

*Azata sororcula* Warren; Swinhoe, 1904: 583 (as good species); Fletcher, 1958a: 137 (as synonym of *Semiothisa trirecurva sororcula*).

*Gonodela* [sic] *unicolor* Warren, 1905: 403. Holotype ♂, [South Africa]: Durban, Natal, (G.F. Leigh); xii.403/*Gonodela unicolor* Warr. ♂ type; Rothschild Bequest B.M.1939-1 (BMNH) [examined]. **Syn. n.**

*Macaria unicolor* (Warren); Janse, 1917: 114.

*Semiothisa unicolor* (Warren); Prout, 1932a: 492; Fletcher, 1978a: 81; Herbulot, 1981: 224.

*Semiothisa sororcula* (Warren); Janse, 1932: 219; 1933-35: 439.

*Gonodela* [sic] *unicolor* Warren; Janse, 1932: 234; 1933-35: 439.

‡*Semiothisa sororcula* (Warren); Janse, 1937-39: 426. Misspelling.

*Semiothisa trirecurva sororcula* (Warren); Fletcher, 1958a: 137; 1978a: 81.

**FORE WING LENGTH.** 13-15 mm (♂), 12-14 mm (♀).

**ADULT** (Fig. 232). Of medium size; fore wings of ♂ narrower; tail on hind wing short. Ground colour of wings ochreous, fairly densely dusted with greyish-brown and in some specimens postmedian area suffused with brown. A poorly defined, rounded, greyish-brown postmedian spot present on fore wing of most specimens. Basal and median line undulating,

poorly developed; postmedian well developed, straight on fore wing, then acutely angled below costa; on hind wing, somewhat convex. Discal spots blackish, rather well developed to nearly absent. Underside in typical specimens vividly yellowish-ochre with fine, regular greyish dusting and a more or less complete brown postmedian fascia. Postmedian line and discal spots developed as on upperside. Vestiture of thorax and abdomen ochreous, interspersed with some greyish scales. Hind tibia of ♂ swollen, exhibiting well developed hair-pencil. Setal comb on A3 prominent. **Variation.** In some specimens from Zimbabwe and southern Zambia, the underside markings are closer to those of *C. confuscata*, above. However, dissection of the genitalia failed to reveal any differences between these specimens and typical *sororcula*.

**MALE GENITALIA** (Fig. 623). Uncus with prominent horns; gnathos deeply emarginate. Costa of valve long, forming a small spatula; sacculus rounded, slightly truncated at termen. Saccus well rounded. Aedeagus comparatively small and attenuated towards the cleft tip; vesica exhibiting a long, twisted median cornutus and a large group of strongly sclerotized microcornuti near apex. Octavals furcate with slightly rounded tips.

**FEMALE GENITALIA** (Fig. 848). Papillae anales small. Both pairs of apophyses elongated, a. anteriores about two-thirds length of a. posteriores. Sterigma inconspicuous, forming small sclerotizations across base of the shell-shaped antrum. Bursa copulatrix elongated with gradual transition between ductus and corpus bursae. Ductus bursae ribbed; wall of corpus around signum bearing minute denticles. Signum well developed.

**DIAGNOSIS.** *Chiasmia sororcula* is closely related to *C. trirecurva* and *C. confuscata*, above. In most cases, *sororcula* can be identified by the uniform ochreous underside of the hind wings. As, however, specimens with underside markings resembling those of *trirecurva* and *confuscata* occur, dissection of the genitalia may be necessary for reliable identification. In the male genitalia, the best diagnostic characters are offered by the aedeagus: in *C. sororcula*, the median cornutus and the apical group of microcornuti are larger and more strongly sclerotized. In the female genitalia, the sterigma and the antrum, though slightly variable in size, are larger in *sororcula*.

**BIOLOGY.** In southern Africa, the species is associated with lowland forest and moist savanna; it does not occur on the central plateau of South Africa. Adults have been collected from January-April, in June, September and November-December.

**DISTRIBUTION** (Fig. 999). Southern Africa, extending northwards to Tanzania and Kenya, but uncommon in the northern part of its range.

MATERIAL. 21♂ (4 dissected, TM genitalia slides No. 10839, 10841, 10894; N.J. Duke genitalia slide No. 5) and 37♀ (4 dissected, TM genitalia slides No. 10840, 10895, 10899, 11048). 1 Berlin (ZMHB), 2 Munich (ZSBS), 5 Nairobi (NMKE), 37 Pretoria (TM), 13 N.J. Duke collection.

LOCALITIES. **South Africa, Transvaal:** [Northern Province]: Entabeni Forest (1), Selati (1), Punda Milia (4). [Mpumalanga]: Skukuza (2). Not traced: Griffin Mine (1). **KwaZulu-Natal:** Umbilo (1), Dukuduku Forest (2), St. Lucia (5), Durban (1), Port Shepstone (1). **Cape Province:** [Eastern Cape]: Beacon Bay (6), The Haven (3). **Zimbabwe:** Hot Springs (3), Victoria Falls (1), Mutare (Umtali) District (1), Salisbury (1), Bubye River (1). **Moçambique:** Maronga Forest (7), Moamba, L. Marques Distr. (1). **Tanzania:** (Deutsch Ost Afrika), Tendaguru, Bezirk Lindi (1), Lindi (2), Moshi (1), Ilonga, Morogoro (1). **Kenya:** Makindu S. of Nairobi (1), Kakamega (2).

Form with intermediate underside:

LOCALITIES. **Zimbabwe:** Victoria Falls (1), Madziwa Mine (1), Mazoe (1), Salisbury (1). **Zambia:** 8 m N. Livingstone (2).

#### 40. *Chiasmia fuscatoria* (Möschler, 1887) comb. n.

Figs 233, 234; 624, 849; 1000

*Semiothisa fuscatoria* Möschler, 1887: 94. Holotype ♂, [Ghana]: Gold Coast, Aburi (not located in SMF) [not examined]. The identity of the species was established from the original description.

*Semiothisa fuscatoria* Möschler; Swinhoe, 1904: 583; Fletcher, 1978a: 80; Herbolut, 1991: 208.

*Gonodela* [sic] *commixta* Warren, 1897a: 106. Holotype ♂, [Nigeria]: Type; Warri, Niger C.P., Febr[uary] [18]96 (Dr. Roth); Rothschild Bequest B.M. 1939-1.; Geometridae genitalia slide No. 1573; IV.106/ *Gonodela commixta* Warr. ♂ type (BMNH) [examined].

*Gonodela* [sic] *commixta* Warren; Swinhoe, 1904: 583 (as good species); Herbolut, 1954b: 325 (as synonym of *feraliata* (Guenée)); Fletcher, 1978a: 80 (synonymy).

FORE WING LENGTH. 16 mm (♂), 12–15 mm (♀).

ADULT (Figs 233, 234). Ground colour of wings whitish, but densely irrorated with sepia. Termen of hind wing with a rather pronounced 'tail', especially in ♂. All lines usually developed but inconspicuous, dark brown. A series of small, whitish to ochreous spots on inner side of postmedian line present in some males. Discal spots small, black. ♀ somewhat less densely irrorated, therefore appearing lighter. Underside whit-

ish with fine sepia striae in basal and median area and more or less wholly sepia in postmedian area in most specimens; however, all transitions between mostly whitish and predominantly sepia specimens are observed. Discal spots present, inconspicuous. Basal and postmedian lines nearly absent, median line better developed, more like a fascia. Vestiture of thorax and abdomen concolorous with wings, paler on underside. Hind tibia of ♂ dilated. Setal comb on A3 present.

MALE GENITALIA (Fig. 624). Uncus horns and gnathos well developed. Valvae large; costa broad, forming a distinct spatula; sacculus prominent, rounded. Aedeagus short and stout. Vesica bearing a large spinose area near apex; a slender, slightly curved cornutus extending from apex to about middle of aedeagus. Octavals furcate and fairly shallow.

FEMALE GENITALIA (Fig. 849). Papillae anales normal. Apophyses slender and inconspicuous, a. anteriores about half length of a. posteriores. Sterigma with small and inconspicuous l. postvaginalis. Antrum shell-shaped, prominent. Bursa copulatrix membranous, ductus accounting for about half of total length, corpus pear-shaped. Signum stellate, of medium size.

DIAGNOSIS. Similar to brownish specimens of 38. *C. confuscata* Warren, but can be recognized by its ground colour which is sepia, rather than dark grey. In *C. fuscatoria*, the postmedian line on hind wing is slightly indented near discal spot (straight in *confuscata*). Differences in the genitalia are evident from the illustrations (compare Figs 622, 624 and 847, 849).

BIOLOGY. The species is associated with tropical and subtropical forests; adults have been observed in April, August and November (Kenya), July (Uganda), April (Zimbabwe) and May (Zaire).

DISTRIBUTION (Fig 1000). West and Central Africa (Ghana, Gabon, Cameroon, Zaire, Rwanda), East Africa (Uganda, Kenya). In southern Africa confined to mountainous habitats in Moçambique and eastern Zimbabwe. The Zimbabwean specimens listed below constitute a new record for southern Africa.

MATERIAL. 47♂ (2 dissected, TM genitalia slide No. 11203, Geometridae genitalia slide No. 16137) (BMNH) and 45♀ (1 dissected, Geometridae genitalia slide No. 16138) (BMNH). 2 London (BMNH), 1 Tervuren (MRAC), 3 Nairobi (NMKE), 64 Bulawayo (NMBZ), 8 Pretoria (TM), 14 C. Herbolut collection.

LOCALITIES. **Zimbabwe:** Mt. Selinda (24), Vumba (5). **Moçambique:** Mussappa R[iver] Forest, Serra Rotanda (14), Serra Rotanda, E. of Chimanimani Mts (22), Dombe (1), Maronga Forest (1). **Kenya:** Yatta Kitui (1), Kakamega (1), Msambweni, Kenya Coast (1). **Uganda:** Entebbe (1). **Rwanda:** Hôtel de l'Akagera (6). **Gabon:** Mouila (2). **Principe:** Sundi

(6). **Cameroon:** Johann-Albrechts-Höhe (1). **Zaire:** (Congo), Lulua, Kapanga (1).

#### 41. *Chiasmia malgassofusca* sp. n.

Figs 235, 236; 625, 850

**TYPE MATERIAL.** Holotype ♂, **Madagascar:** Est, env[irons] de Perinet, alt[itude] 910 m, forêt d'Analamazoatra, P. Viette le 24-XI-1954 (MNHN). Paratypes (22♂, 6♀). **Madagascar:** 2♂, 3♀, *ibidem*, dated 22.XI.1954 (♂), 24.XII.1954 (♀), 27.XII.1954 (♂), 17.I.1955 (♀), 22.II.1955 (♀), 24.II.1955 (♀); 1♂, 1♀, *ibidem*, leg. C. Herbuleot, dated 11.-19.III.1955; Pr[éparation] No. 6610 C. Herbuleot (♂), No. 14 (♀); 3♂, Périnet, February 1935 (N. & G. Olsoufieff); Rothschild Bequest B.M.1939-1.; *ibidem*, dated March 1935 (8); Sta[tion] Périnet, 149 km east of Tananarivo, I/[19]33 (Mme. N. d'Olsoufieff) (6); 1♂, Madagascar Est, Piste d'Andapa à Ambalapaiso, 25 km Ouest d'Andapa, 725 m, 24/28-XI-1968 (P. Griveaud, A. Peyrieras et P. Viette); 1♂, Madagascar Est, Marojejy, rés[erve] nat[ional] int[égrale] XII, Beondroka, 1200 m, XII-1960 (P. Soga); 1♀, Madagascar Est, Route d'Anosibe km 57, P. Viette le 15-2-1955 (MNHN, BMNH, C. Herbuleot collection).

FORE WING LENGTH. 15-17 mm (♂), 15-16 mm (♀).

**ADULT** (Figs 235, 236). Very similar to *C. fuscatoria*, above. For a description, see under that species. The row of small, whitish to ochreous spots on the inner side of postmedian line present in some ♂♂ of *fuscatoria* is not found in *malgassofusca*. Also, in this species the proximal portion of the postmedian area is of a warm chocolate brown, a character less prominently displayed by *fuscatoria*. Hind tibia of ♂ dilated, bearing hair pencil. Setal comb on A3 present.

**MALE GENITALIA** (Fig. 625). Uncus horns long, well sclerotized; gnathos slender. Costa of valve elongated, spatula moderately broad. Sacculus rounded, with small indentation. Aedeagus small and fusiform, slightly curved and cleft apically. Inner margin of cleft bearing denticles; in addition, a thin median cornutus present. Octavals furcate, narrow, with acute tips.

**FEMALE GENITALIA** (Fig. 850). Papillae anales normal. Apophyses moderately stout, a. anteriores approximately two-thirds length of a. posteriores. Sterigma: sclerotizations of l. postvaginalis small, l. antevaginalis not modified. Antrum wide, shell-shaped. Bursa copulatrix elongated, stouter than in preceding species. Ductus bursae broad, finely ribbed; corpus roughly tear-shaped, with prominent signum situated near centre.

**DIAGNOSIS.** Only separable with certainty from *C. fuscatoria* by means of dissection of the genitalia. The

males are best separated by the differences in the aedeagus, which is more robust in *fuscatoria*. The genitalia of the females are more difficult to separate, but the sclerotizations formed by the lamella postvaginalis seem to be smaller in *C. malgassofusca*. The two species are allopatric, *malgassofusca* being endemic to Madagascar and *fuscatoria* occurring on the African mainland.

**BIOLOGY.** Widespread and apparently not uncommon locally, with most specimens having been collected in the rainforests in the eastern parts of Madagascar. Adults have been observed in January and March.

**DISTRIBUTION.** Madagascar, with most records from the eastern parts.

**FURTHER MATERIAL.** 6♂ and 4♀. 1 London (BMNH), 9 C. Herbuleot collection.

**LOCALITIES.** **Madagascar:** Périnet, Analamazaotra (3), E., env. Périnet, 910 m, Analamazaotra Forest (4), Station Perinet 149 km E. Tananarivo (1), Maroantsetra (1), Ranomafana, RIG 8 at km 401 (1).

**ETYMOLOGY.** From neo-Latin *malgassus* (-a, -um), pertaining to Madagascar, and *fuscus* (-a, -um), reddish brown; in allusion to the distribution and the colour of the moth. The name was originally suggested by C. Herbuleot.

#### 41. *Chiasmia flavicuneata* (Herbuleot, 1987) comb. n.

Figs 237, 238; 626, 851

*Semiothisa flavicuneata* Herbuleot, 1987: 280. Holotype ♂, **Rwanda:** SW., Wincka, 2500 m, 21.-22.vi.1974 (B. Turlin); Pr[éparation] No. 5158 C. Herbuleot; *Semiothisa flavicuneata* Hrblt. Holotype (C. Herbuleot collection) [examined]. Paratypes (2♂). **Rwanda:** 1♂, *ibidem*, 2000 m, 8.iii.1975; 1♂, *ibidem*, route Delvaux au km 17, 2000 m, 23.iv.1975 (B. Turlin) (C. Herbuleot collection) [examined].

FORE WING LENGTH. 16 mm (♂), 13-15 mm (♀).

**ADULT** (Figs 237, 238). Of medium size. Fore wings ochreous with darker brown suffusion, particularly in postmedian area; hind wings grey, in one specimen with dense darker striations. All three lines developed on fore wing, but basal and median poorly defined; postmedian fine, angled at ca. 90° below costa. Hind wing with faint median and occasionally vestigial basal line. Discal spots faint on fore wing but conspicuous on hind wing. Underside greyish-brown with fine darker striation, in one specimen hind wing suffused with white. Lines absent but discal spots present. Vestiture of thorax and abdomen greyish-brown, lighter on ventral side. Hind tibia of ♂ dilated. Setal comb on A3 present.

MALE GENITALIA (Fig. 626). Uncus horns large; gnathos well developed. Costa of valve with a comparatively narrow, pointed spatula; sacculus rounded, with uneven posterior margin. Aedeagus stout and fusiform, vesica bearing a single large cornutus. Octavals weakly sclerotized, acutely furcate.

FEMALE GENITALIA (Fig. 851). Papillae anales well rounded. Both pairs of apophyses delicate, a. anteriores about two-thirds length of a. posteriores. Sterigma with l. postvaginalis forming small sclerotizations; l. antevaginalis not modified. Antrum shell-shaped, relatively narrow. Bursa copulatrix resembling a large, gradually widening tube. Posterior section of ductus ribbed, rest of bursa membranous. Signum circular, small, situated near centre of corpus bursae.

DIAGNOSIS. Relatively easily recognized due to the differently coloured, brown-and-grey wings and the postmedian on the fore wings which is quite straight below the costal angle. The differences to similar species in genitalic structure can be seen from the figures.

BIOLOGY. *Chiasmia flavicuneata* is associated with tropical forest. Adults have been collected in March. The species is rare in collections.

DISTRIBUTION. East Africa, so far only known from Kigezi Province in Uganda and south-west Rwanda.

MATERIAL. 2♂ (1 dissected, genitalia slide No. 14 (NMKE)) and 4♀ (1 dissected, genitalia slide No. 15 (NMKE)). 1 London (BMNH), 5 Nairobi (NMKE).

LOCALITIES. **Uganda:** Kayonza, Kigezi (2), Impenetrable Forest, Kigezi (4) (BMNH, NMKE).

#### 43. *Chiasmia separata separata* (Warren, 1899) comb. n.

Figs 239–241, 627, 852; 1001

*Azata separata* Warren, 1899a: 59. Holotype ♀. [Tanzania]: Mikindani, i to v [18]97 (Reimer); vi.59/ *Azata separata* Warr. ♀ type; Rothschild Bequest B.M.1939-1 (BMNH) [examined].

*Azata separata* Warren; Swinhoe, 1904: 583.

*Gonodela* [sic] *rectilinea* Warren, 1905b: 403. Holotype ♂. **Ivory Coast:** Ganyonyo, 2.–7. May [19]03 (Pemberton); xii.403/*Gonodela* [sic] *rectilinea* Warr. ♂ type; Rothschild Bequest B.M. 1939-1 (BMNH) [examined].

*Macaria rectilinea* (Warren); Janse, 1917: 114.

*Semiothisa rectilinea* (Warren); Janse, 1932: 210; Pinhey, 1975: 86.

*Semiothisa separata* (Warren); Herbule, 1954b: 324; Fletcher, 1958a: 137; 1978a: 81.

*Gonodela* [sic] *rectilinea* Warren; Fletcher, 1958a: 137 (synonymy); 1978a: 81 (as synonym of *separata*).

FORE WING LENGTH. 13–17 mm (♂), 13–16 mm (♀).

ADULT (Figs 239–241). Ground colour of wings whitish, densely irrorated with grey (♂) or fuscous ochre (♀). Fore wings narrower in male, hind wings of both sexes with a fairly well developed 'tail'. Basal and median lines weakly developed or absent, postmedian line well developed, straight, dark brown, sometimes bordered by ochreous. Postmedian area darker in both sexes, in females often with one or several dark spots. Discal spots small to medium-sized, not conspicuous. Underside: ground colour whitish; basal and median areas densely irrorated with fuscous to dark brown, postmedian area uniformly brown except for a whitish area at anal angle of hind wing and near termen of fore wing; apex of fore wing orange brown. Discal spots and lines with exception of postmedian weakly developed. Vestiture of thorax and abdomen ranging from ochreous to grey. Hind tibia of ♂ dilated. Seta comb on A3 present.

MALE GENITALIA (Fig. 627). Large for the size of the moth. Uncus horns prominent; gnathos not very deeply emarginate, rather like a transverse band. Valves strongly elongated; costa forming a broad spatula, sacculus rather small and rounded. Aedeagus cylindrical, with two long, needle-like cornuti and a patch of microcornuti below apex. Octavals arcuate, with rounded tips.

FEMALE GENITALIA (Fig. 852). Papillae anales small. Both pairs of apophyses slender, a. anteriores rather more than two-thirds length of a. posteriores. Sterigma forming moderately large sclerotizations near base of the shell-shaped antrum. Bursa copulatrix strongly elongated; ductus bursae ribbed, corpus membranous. Signum large.

DIAGNOSIS. Externally rather like 44. *C. livorosa*, with which ssp. *conjugata*, below, is sympatric. *C. livorosa* is usually larger and more greyish in coloration; furthermore it can be separated in the male genitalia by the shape of the octavals and arrangement of cornuti on the vesica. From other, similar species *C. separata* may be readily separated by the straight postmedian line on the fore wing.

BIOLOGY. The species occurs in varied habitats such as dry mixed savanna and coastal dune forest in KwaZulu-Natal. In South Africa, adults were collected from January to May, September to October and in December.

DISTRIBUTION (Fig. 1001). Widely distributed in the Afrotropical region, including Madagascar. In southern Africa occurring in a fairly narrow band between 29° and 33°E, with most records from KwaZulu-Natal, the eastern Transvaal and Zimbabwe.

MATERIAL. 60♂ (1 dissected, TM genitalia slide No. 10867) and 74♀ (1 dissected, TM genitalia slide No.

10868). 13 London (BMNH), 5 Munich (ZSBS), 19 Nairobi (NMKE), 50 Pretoria (TM), 3 Cape Town (SAM), 17 Bulawayo (NMBZ), 12 C. Herbule collection, 11 N.J. Duke collection, 4 H.S. Staude collection.

**LOCALITIES.** **South Africa, Transvaal:** [Northern Province]: Pafuri (2), Punda Milia (1), Selati (2), Soutpansberg, Wyllie's Poort (3), Soutpansberg, Entabeni Forest (1). [Mpumalanga]: Malelane (1), Lower Sabie (1), Skukuza (4). **KwaZulu-Natal:** Dukudu Forest (5), St. Lucia Bay (11), Jozini Dam, Lebombo Mountains (7), Nyalazi Forest (1), Durban (12), Ingwavuma (1), Mkuze (2), Maphalana (2), Tongaat (1), Drummond (1), Mtunzini (1). **Cape Province:** [Eastern Cape]: Port St. John's (1). **Zimbabwe:** Mutare (Umtali) District (1), Hot Springs (1), Dichwe Forest (2), Harare (Salisbury) (3), Vumba Mts (2), 96 m SE of Nuanetsi (2), Black Mountain N. of Melsetter (2), Doddieburn Ranch (1), Bubye Bridge, Chikwarakwara Dip (1). **[Malawi]:** (Nyassaland), Zomba Plateau (1). **Mozambique:** Salone River Forest, Marromeu (2), Mussapa River Forest, Serra Rotanda (1), Maputo (Lourenço Marques) (1). **Angola:** Quirimbo, 75 km E. P. Amboim. 300 m (1), Fazenda Congulu, Amboim Distr., 7–800 m (1). **Tanzania:** Tanganyika, Old Shinyaga (1), Amani, E. Usambara Mountains (3), Morogoro (2), Nachingwea (1), Dodoma (1), Lindi (2). **Kenya:** Nairobi (2), Ngong/Nairobi (9), Mt. Elgon (1), Isiolo (4). **Uganda:** Zika Forest, Entebbe (2), Toro, Kibale Forest (3). **Rwanda:** Hôtel de l'Akagera (3). **Nigeria:** S., Kaduna (3), Bitye, Ja River (1). **Ivory Coast:** Bingerville (5), Lamto, 36 km NNW. Tiessalé (2), Yapo Sud (1). **Fernando Poo:** no further data (1). **Cameroon:** Johann-Albrechts-Höhe (2), Mt. Kala, 18 km W. Yaoundé, 1100 m (3).

#### 43a. *Chiasmia separata conjugata* (Herbulot, 1966) comb. n.

not illustrated

*Semiothisa separata conjugata* Herbulot, 1966: 217. Holotype ♂, **Madagascar:** Type; Madagascar Sud, domaine de l'ouest, route de Tulear à Ihosy au km 54, 28.xii.[19]64, Collection Jacques Plante; *Semiothisa separata conjugata* Hrblt. Type; *Semiothisa separata conjugata* Hrblt., Bull. mens. Soc. Linn. Lyon, 35ème an., 1966, p. 217 (MNHN) [examined].

**DIAGNOSIS:** Adult. The main differences to the nominate subspecies are found on the underside, which is much lighter than in *separata separata*, yellowish-orange with hardly any contrasts. In addition, the postmedian on both wings is gently curved, not straight. Upperside coloration of the holotype is also paler than in most southern African specimens. Fore wing length as in nominate subspecies.

**BIOLOGY.** Mostly collected in dry forest at altitudes from 80–640 m from December–February.

**DISTRIBUTION.** Madagascar.

**MATERIAL.** 40♂ and 7♀. 2 London (BMNH), 45 Paris (MNHN).

**LOCALITIES.** **Madagascar:** W., Befasy Forest, 45 km S. Morondava (11), Sakaraha (1), N., Analamerana Forest, 50 km SE. of Diego Suarez, 80 m (1). W., rés. spéciale du Zombitsy matsabory, 640 m (22), W., Nat. Road 7, 64 km E. of Tulear, Andranovary Forest, 500 m (11), S., N. of Tulear, Mikea Forest, Analabô, Ampasikibo-Salary road (1).

#### 44. *Chiasmia livorosa* (Herbulot, 1964) comb. n.

Figs 242–244; 628, 853

*Semiothisa livorosa* Herbulot, 1964: 257. Holotype ♂,

**Madagascar:** Type; Madagascar Nord, contreforts du Tsaratanana, Haut Sambirano, 1100 m, vallée de la Besanetrikely, 9.–12.XII.1963 (P. Viette); *Semiothisa livorosa* Hrblt. Type; *Semiothisa livorosa* Hrblt., Bull. Soc. ent. Fr., 1965, 69, (1964), p. 257 (MNHN) [examined].

**FORE WING LENGTH.** 15 mm (♂), 14 mm (♀).

**ADULT** (Figs 242–244). Ground colour of wings whitish, densely irrorated and striated with olive-grey in basal and median area; postmedian area wholly olive-grey. Basal and median lines very faint, postmedian line better developed, straight or nearly so. Discal spots present but inconspicuous. Postmedian area of ♀ with some darker maculation. Hind wing with a slight 'tail'. Underside white, with dense orange-brown striation in basal and median area. Median line present, but more like a fascia. Postmedian area orange-brown with some whitish maculation along termen and on apex of fore wing. Discal spots faint. Thorax and abdomen olive-grey. Hind tibia of ♂ dilated. Setal comb on A3 present.

**MALE GENITALIA** (Fig. 628). Uncus horns large; gnathos normally developed. Costa of valve massive, distinctly spatulate, sacculus moderately large, angular. Aedeagus short, tapering anteriorly; vesica bearing a single, needle-like cornutus and an area studded with microcornuti in apical region. Octavals arcuate, tips pointing outwards.

**FEMALE GENITALIA** (Fig. 853). Papillae anales small. Both pairs of apophyses delicate, a. anteriores rather more than two-thirds length of a. anteriores. Sterigma: sclerotizations of l. postvaginalis small, l. antevaginalis unmodified. Antrum medium-sized. Ductus bursae long

and wide, strongly ribbed; corpus elliptical, slightly shorter than ductus and membranous, with medium-sized signum near middle.

**DIAGNOSIS.** Similar to *Chiasmia separata*, above, and *C. neolivorosa*, below; all three are characterized by the straight postmedian line on the fore wing. In the male genitalia, the best diagnostic characters are probably provided by the shape of the aedeagi and the arrangement of the cornuti, as well as by the shape of the octavals. In *C. livorosa*, the aedeagus tapers anteriorly and the octavals are broadly arcuate, their tips pointing outwards. In the female genitalia, *C. separata* possesses a shorter and narrower ductus bursae than the other species. The sclerotizations at the base of the antrum are largest in *separata*, smallest in *livorosa* and of intermediate size in *neolivorosa*.

**DISTRIBUTION.** Endemic to Madagascar.

**BIOLOGY.** Apparently associated with dry forest. The holotype was collected at an altitude of 1200 m in the Besanetriky valley which forms part of the Haut Sambirano region of Madagascar. Adults have been collected in February, April and December.

**MATERIAL.** 29♂ (1 dissected, Geometridae genitalia slide No. 16141) (BMNH) and 15♀ (1 dissected, Geometridae genitalia slide No. 16142) (BMNH). 20 London (BMNH), 24 Paris (MNHN).

**LOCALITIES.** **Madagascar:** Diego Suarez (19), S., Lambomakandro, Sakaraha Distr., Tulear rd. at km 808 (2), N., Analamerana Forest, 50 km SE. Diego Suarez, 80 m (5), W., Befasy Forest, 45 km S. of Morondava (6), W., Zombitsy matsabory reserve, 640 m (12).

#### 45. *Chiasmia neolivorosa* sp. n.

Figs 245; 629, 854

**TYPE MATERIAL.** Holotype ♂, **Madagascar:** Sud-Ouest, Lambomakandro, 500 m, Tuléar, 16–VII–[19]57 (P. Griv[eaud]); Institut Scientifique Madagascar; genitalia slide M. Krüger No. 12 (MNHN). Paratypes (2♂, 4♀). **Madagascar:** 1♂, same data as holotype; *livorosa* Hrblt. [handwritten, misidentification]; 1♀, Sud-Ouest, Ampanihy, 150 m, 28VI–[19]57 (P. Griv[eaud]); Institut Scientifique Madagascar; 3648R; 1♀, Ouest, route nationale 7, 64 km E. de Tuléar, forêt d'Andranovory, 500 m, 8/10–XII–1966 (P. Viette et P. Griveaud); 1♀, *ibidem*, dated 25/28–X–1967 (P. Griveaud et Ratovoson); 1♂, Bekly, Rég[ion] sud de l'île; Muséum Paris, V.[19]39 (A. Seyrig); 1♀, Ouest, Antsaloa, Bord Réserve Antsingy, Mijamo, 90 m, 2–10–VII–1970 (P. Griveaud) (genitalia slide M. Krüger No. 17) (MNHN).

**FORE WING LENGTH.** 16–17 mm (♂), 15–18 mm (♀).

**ADULT** (Fig. 245). Well medium-sized. Fore wing, particularly of ♂, pointed; hind wing with short tail in both sexes. Ground colour of wings cream, densely irrorated and striated with olive green; postmedian area wholly suffused with olive (♂♂) or nearly so, leaving some paler blotches (♀♀). Basal and median line undulating, weak to absent; postmedian better developed, straight or nearly so, in some specimens bordered on the inside by a fine yellow line. Discal spots present, but small and inconspicuous. Underside chalk white with intense greyish-brown striation; lines and discal spots as on upperside. Postmedian area with a broad brown fascia, partly suffused with orange. Some whitish patches near anal angle of hind wing and at apex and near middle of fore wing present in most specimens. Vestiture of thorax and abdomen ochreous-olive, mixed with darker scales. Hind tibia of ♂ somewhat dilated, but without hair pencil. Setal comb on A3 present.

**MALE GENITALIA** (Fig. 629). Uncus horns well developed; gnathos normal. Costa of valve straight, forming a well developed spatula. Sacculus rounded, with a small indentation. Aedeagus rather short, slightly fusiform; vesica with a single cornutus in apical half and an almost transverse band of microcornuti. Octavals narrowly furcate, the tips forming small, rounded knobs.

**FEMALE GENITALIA** (Fig. 854). Papillae anales small and rounded. Apophyses delicate, a. anteriores hardly shorter than a. posteriores. Sterigma: l. postvaginalis forming sclerotization across base of antrum; l. antevaginalis not modified. Antrum well developed, shell-shaped but rather narrow. Bursa copulatrix strongly elongated, membranous except for posterior two-thirds of ductus, which are somewhat more heavily sclerotized and well ribbed. Corpus bursae tear-shaped, only slightly wider than ductus. Signum medium-sized and rounded situated in centre of corpus bursae.

**DIAGNOSIS.** Externally resembling *C. livorosa*, above, but wings characterized by an olivaceous hue that is absent in that species. In the male genitalia, the octavals of *neolivorosa* are narrower, the tips not pointing outward, and the juxta is differently shaped (compare Figs 629, 630). In the female genitalia, the sclerotizations near the base of the antrum are larger in *neolivorosa*.

**BIOLOGY.** Like *Chiasmia livorosa*, the species is restricted to the dry forests of south-west and west Madagascar, where it has been collected at altitudes between 90 and 500 m. Adults are active in May–July, October and December.

**DISTRIBUTION.** West and south-west Madagascar.

**ETYMOLOGY.** From Greek νέος, new, and *Chiasmia livorosa*: the two species are very closely related.

**46. *Chiasmia parallacta* (Warren, 1897) comb. n.**

Figs 246; 630, 855; 1002

*Semiothisa parallacta* Warren, 1897a: 112. Holotype ♂, [Malawi]: Zomba, Upp[er] Shiré R[iver], 3000 f[ee]lt, xii [18]95 (Dr. P. Rendall); iv.112/*Semiothisa parallacta* Warr. ♂ type; Rothschild Bequest B.M.1939-1 (BMNH) [examined].

*Semiothisa parallacta* Warren; Warren, 1897b: 399 (description of ♀); Swinhoe, 1904: 583; Janse, 1932: 221; Fletcher, 1978a: 81.

*Gonodela* [sic] *apicepallens* Warren, 1905b: 401. Holotype ♀, **Angola**: Banga Ngola, 9. Oct[ober] 1903 (Dr Ansorge); xii.401/*Gonodela* [sic] *apicepallens* Warr. ♀ type; Rothschild Bequest B.M. 1939-1 (BMNH) [examined].

*Semiothisa*? *stramineata* Bastelberger, 1909: 101. Holotype ♀, [Tanzania]: Nyassaland, D[eutsch] Ost-Afrika, Kigonsera; Warr[en] det[erminavit]; T; Coll. Bastelberger; Typus; Lep[idoptera] 447 [obliterated] 2714 *stramineata* (SMF) [examined]. **Syn. n.**

*Gonodela* [sic] *apicepallens* Warren; Fletcher, 1978a: 81 (synonymy).

FORE WING LENGTH. 12 mm (♂), 13 mm (♀).

ADULT (Fig. 246). Antennae greyish-yellow. Ground colour of wings a pale greyish yellow, slightly irrorated with darker grey. Fore wings narrow, hind wings with a pronounced 'tail'. Lines very weakly developed, postmedian line on fore wing borderer by several dark spots. Discal spots faint. Underside: ground colour as on upperside, a faint darker postmedian fascia usually present; irroration slightly heavier than on upperside. Discal spots also faint. Vestiture of thorax and abdomen concolorous with wings. Hind tibia of ♂ dilated. Setal comb on A3 absent.

MALE GENITALIA (Fig. 630). Uncus horns long. Gnathos slender, deeply emarginate. Valves fairly stout. Costa strongly spatulate; sacculus rounded, with termen forming a short, drooping process. Aedeagus somewhat spindle-shaped and cleft apically; vesica bearing a single, very short median cornutus and exhibiting a subapical patch of microcornuti. Octavals arcuate, with rounded tips.

FEMALE GENITALIA (Fig. 855). Papillae anales relatively small. Apophyses slender, a. anteriores less than half length of a. posteriores. Antrum typical of the group, sterigma plain. Bursa copulatrix elongated. Ductus bursae narrow, posterior two-thirds ribbed. Corpus bursae tear-shaped, membranous. Signum fairly large.

DIAGNOSIS. This very pale, small species may be confused with similar specimens of 47. *C. paucimacula*, below, although the moth is usually paler and has some small dark spots along the postmedian line on the fore wing, as well as a slightly longer 'tail' on the hind wing.

*C. parallacta* almost or totally lacks the dark scales present on the underside of the fore wing costa in *paucimacula*. The genitalia are also quite similar but differ as follows: in the male, the aedeagus of *C. parallacta* appears shorter, not becoming narrower anteriorly, and the octavals, though similar in shape, are smaller. In the ♀, the bursa copulatrix of *parallacta* is shorter, and there appear to be no lateral sclerotizations of the sterigma.

BIOLOGY. In southern Africa the species seems to be associated with frost-free savanna. Adults were collected in August and September.

DISTRIBUTION (Fig. 1002). In southern Africa, the species has only been collected in the vicinity of Harare (Salisbury) in northern Zimbabwe and the Mutare District (Umtali). The holotype is from the Zomba plateau in Malawi. Equatorial Africa (Fletcher, 1978a), including Nigeria and Zaire.

MATERIAL. 8♂ (2 dissected, TM genitalia slide No. 10972; N.J. Duke genitalia slide No. 6) and 8♀ (1 dissected, TM genitalia slide No. 11143), 9 London (BMNH), 1 Munich (ZSBS), 1 Tervuren (MRAC), 3 Pretoria (TM), 1 Bulawayo (NMBZ), 1 N.J. Duke collection.

LOCALITIES. **Malawi:** (Nyasaland), Shire Valley, Mwanza River, 600 ft (2), Valley of S. Rukuru R., 3000 ft (2), Karonga Distr., Valley of N. Rukuru, 2400 ft (1).

**Zimbabwe:** Harare (Salisbury) (3), Mutare District (Umtali) (1), Aberfoyle, Honde Valley (1). **Zambia:** (NE Rhodesia), E. Loangwa Distr., 3–3500 ft., Mbala country (1), Upper Luangwa, Luwumbu Valley, 25–3500 ft (1). **Nigeria:** Jemaa (1). **Zaire:** (Congo), Lulua, Kapanga (1), Elisabethville (2).

**47. *Chiasmia paucimacula* sp. n.**

Figs 247; 631, 856; 1003

TYPE MATERIAL. Holotype ♂, [Zimbabwe]: (Southern Rhodesia), Mutare (Umtali) District, 19.3.1933 (P.A. Sheppard); TM Lep[idoptera] Het[erocera] Genitalia slide No. 11104 (TM). Paratypes (4♂, 15♀).

[**Zimbabwe:**] 7♀, same data as holotype; TM Lep. Het. Genitalia slide No. 11105; 1♀, S[southern] Rhodesia, Umtali District, Hospital, 13.12.1935 (P.A. Sheppard); 1♂, 2♀, S[southern] Rhodesia, Harare (Salisbury) (A.J. Duke), dated 17.3.[19]68 (♀) and 2.3.[19]69 (♂, ♀); 1♂, S[southern] Rhodesia, Lowdale, 18.1.[19]69 (A.J. Duke); Aberfoyle, Honde Valley, 26.04.[19]93 (N.J. Duke). [**South Africa:**] [Northern Province]: 1♀, Punda Milia, K[ruger] N[ational] P[ark] Survey, 6.–15.v.1975 (Potgieter & Scoble). **Cameroon:** 1♂, Plateau de Kounden, 4 km S.E. Centre Vétérin, 1410m, 6 et 7.IV.1972 (C. Herbulot). **Malawi:** N. Malawi,

Dzelanyama Forest, 4000 ft., 9.IV.1993 (R.J. Murphy). **Tanzania:** 1 ♀, Amani, E[ast] Usambara M[oun]t[ain]s, iv 1955, Nat[ional] Mus[eum] Bulawayo. **Nigeria:** 1 ♀, Jemaa (TM, ZSBS, NMBZ, C. Herbule collection, N.J. Duke collection).

FORE WING LENGTH. 12–14 mm (♂), 11–14 mm (♀).

ADULT (Fig. 247). Ground colour of wings pale ochreous with darker suffusion. Fore wings rather narrow, 'tails' on hind wing pronounced. All three lines present but weak; basal line on hind wing virtually absent in most specimens. Postmedian area usually with a dark fascia of varying intensity. Discal spots small. Underside: similar to upperside, lines more clearly developed, a brown postmedian fascia of varying width present. Dark dusting present along costa of fore wing. Thorax and abdomen concolorous with wings. Hind tibia of ♂ dilated. Setal comb on A3 present.

MALE GENITALIA (Fig. 631). Uncus horns long; gnathos rather small, with narrow arms. Valvae elongated, with massive, spatulate costa; sacculus smaller, rounded. Aedeagus somewhat spindle-shaped; vesica bearing several small apical cornuti and a group of microcornuti. Octavals broadly bifurcate.

FEMALE GENITALIA (Fig. 856). Papillae anales small. Apophyses posteriores and anteriores short, slender. Sterigma: l. antevaginalis not modified; l. postvaginalis forming small sclerotizations across base of the shell-shaped antrum. Bursa copulatrix strongly elongated. Posterior two-thirds of ductus ribbed, remainder of bursa wall membranous. Signum large, elliptical.

DIAGNOSIS. Similar in size and coloration to *C. parallacta*, above, to which it is closely related. The species can, however, be readily separated externally: *parallacta* is much paler than *paucimacula* and has a number of black spots along the postmedian line of the fore wing which are absent in the latter. The dark dusting along the fore wing costa is more intense in *C. paucimacula*. The differences in the genitalia are described under *C. parallacta*, above.

BIOLOGY. Adult specimens were collected in December–January and March (Zimbabwe), April (Tanzania) and May (Transvaal). Apparently a local species.

DISTRIBUTION (Fig. 1003). Widely distributed from Cameroon, Nigeria and Zaire to East Africa (Uganda, Tanzania, Malawi) and the southern part of the continent (Zambia, Zimbabwe, Moçambique and northernmost Northern Province in South Africa).

FURTHER MATERIAL. 6 ♂ and 4 ♀. 10 Bulawayo (NMBZ).

LOCALITIES. **Zimbabwe:** Salisbury (2), Vumba (1), Umtali District (1), Umvumvu R[iver], Melsetter District (1). **Zambia:** Mwinilunga (1), 30 m S. Ndola (1).

**Moçambique:** Salone River Forest, Marromeu (1). **Uganda:** Zika Forest, Entebbe (1). **Zaire:** Lubudi (1).

ETYMOLOGY. From Latin *pauci-*, few, and *macula* (-ae), a spot; on account of the weakly marked wings.

#### 48. *Chiasmia phaeostigma* (Fletcher, 1958) comb. n.

Figs 248, 249; 632, 857

*Semiothisa phaeostigma* Fletcher, 1958b: 131.

Holotype ♂, **Uganda:** Ruwenzori Range, Mahoma River, 6700 ft., 13.–16.VIII.1952 (D.S. Fletcher); Ruwenzori Exped[ition] B.M. 1952–566; Geometridae genitalia slide No. 1791; Genitalia photographed. B.M. Neg[ative] 18537; Photographed B.M. Neg[ative] 18518; *Semiothisa phaeostigma* Fletcher ♂ Holotype (BMNH) [examined]. Paratypes (3 ♂, 1 ♀). **Uganda:** same data as holotype (BMNH) [examined].

FORE WING LENGTH. 13 mm (♂), 14 mm (♀).

ADULT (Figs 248, 249). Fairly small. Ground colour of wings whitish, but densely suffused with mouse grey and with additional grey striation, particularly on fore wing. All three lines indistinct on fore wing, but their position marked by black maculae along costa; postmedian acutely angled below costa, bordered by some blackish-brown maculae. All lines almost wholly reduced on hind wing. Discal spots minute. Preapical spot prominent, blackish-brown. Underside very sombre, whitish, with extensive, dark grey suffusion; on apex of fore wing and in postmedian area of hind wing mixed with brown. Discal spots and median line faint, other markings absent. Vestiture of thorax and body grey. Hind tibia of ♂ not dilated. Setal comb on A3 present.

MALE GENITALIA (Fig. 632). Uncus horns well developed; gnathos very deeply emarginate. Costa of valve gently recurved, forming a rather narrow spatula. Sacculus not large, fairly well rounded and distal margin with some faint sclerotization. Aedeagus short and stout, strongly fusiform; vesica bearing a single median cornutus and exhibiting a subapical patch of microcornuti. Octavals broadly furcate, with rounded tips.

FEMALE GENITALIA (Fig. 857). Papillae anales elongated and narrow. Apophyses posteriores long and delicate; a. anteriores stouter, about two-thirds length of former. Sterigma: l. antevaginalis not particularly modified; l. postvaginalis forming rounded sclerotizations across base of antrum. Antrum shell-shaped, rather slender and more rounded than in other species of the group. Bursa copulatrix elongated; ductus faintly ribbed posteriorly; corpus membranous, with large signum, situated towards centre of corpus.

**DIAGNOSIS.** The falcate fore wings and 'tailed' hind wings are similarly developed in 168. *C. gyliura*, below, but *gyliura* is usually larger, and the drab coloration of *C. phaeostigma* should enable ready identification. Other Macariini with falcate fore wings and tailed hind wings are much paler.

**BIOLOGY.** *Chiasmia phaeostigma* inhabits montane tropical forest at around 2200 m. Adults have been collected in March and August.

**DISTRIBUTION.** East Africa, restricted to Ruwenzori Mountains in Uganda, and adjoining areas in Rwanda.

**MATERIAL.** 3♂ (1 dissected, genitalia slide No. 30) (NMKE) and 3♀ (1 dissected, genitalia slide No. 31) (NMKE). 2 Nairobi (NMKE), 4 C. Herbuleot collection.

**LOCALITIES.** **Uganda:** Kigezi, Impenetrable Forest (1); Kigezi, Kayonza (1). **Rwanda:** NW., Gishwati Forest, Nyamyumba, 1800 m (1), SW., Nyungwe Forest, Wincka, 2500 m (1), SW., Nyungwe village, 2000 m (2).

#### 49. *Chiasmia natalensis* (Warren, 1904) comb. n.

Figs 250, 251; 633, 858; 1002

*Semiothisa natalensis* Warren, 1904: 479. Holotype ♂, [South Africa, KwaZulu-Natal]: Durban, Natal; XI.479/Semiothisa natalensis Warr. ♂ type; Rothschild Bequest B.M. 1939-1 (BMNH) [examined].

*Macaria natalensis* (Warren); Janse, 1917: 114.

*Semiothisa natalensis* Warren; Janse, 1932: 226.

**FORE WING LENGTH.** 13–14 mm (♂), 11–13 mm (♀).

**ADULT** (Figs 250, 251). Ground colour of wings straw-yellow, densely irrorated with olivaceous green. Fore wings narrow, emarginate below apex, hind wings with pronounced 'tail'. Basal line weakly developed. Median line usually better developed, but also not clearly demarcated. Postmedian line well developed, fine, with four blackish interneurals present on fore wing. Postmedian area usually with heavier olivaceous suffusion, especially on hind wing. Discal spots present, well developed to nearly absent. Underside: ground colour as on upperside. Discal spots heavy, dark brown. Median line well developed, dark brown. A dark brown fascia bordering postmedian line. Emargination of fore wing marked by a large, dark brown spot. Thorax and abdomen straw-yellow to olivaceous. Hind tibia of ♂ dilated. Seta comb on A3 present.

**MALE GENITALIA** (Fig. 633). Uncus horns long and slender; gnathos deeply emarginate. Valve large, costa forming a broad spatula; sacculus well rounded, exhibiting sclerotizations along termen. Aedeagus short and

stout, cleft apically. Vesica bearing a single, slightly curved cornutus a short distance from apex; a large area with granulose texture present near tip of aedeagus. Octavals w-shaped, tips well rounded.

**FEMALE GENITALIA** (Fig. 858). Papillae anales narrow and elongated. Apophyses posteriores rather short and slender, a. anteriores slightly stouter, approximately two-thirds length of former. Sterigma: l. antevaginalis not particularly modified; l. postvaginalis forming medium-sized sclerotizations near base of ostium. Antrum well developed, shell-shaped. Bursa copulatrix pyriform with long and rather narrow, strongly ribbed ductus and elliptical, membranous corpus bursae. Signum very large, somewhat elliptical.

**DIAGNOSIS.** Perhaps most similar to the Madagascan endemic 50. *C. coronoleucas*, below. A further similar species is 51. *C. fontainei*, below; however, this is characterized by more extensive dark dusting. The differences in genitalia structure may be seen from the illustrations (compare Figs 633–635 and 858–860).

**BIOLOGY.** Predominantly a species of the subtropical forests of KwaZulu-Natal, but occurring along the Escarpment in Malawi and Zimbabwe. Adults have been collected from November to March and, less frequently, from April to June.

**DISTRIBUTION** (Fig. 1002). Largely restricted to coastal areas from central and northern KwaZulu-Natal, particularly in Zululand, northwards to Malawi. Single inland records exist from Vumba and Mt. Selinda areas in eastern Zimbabwe and southern Tanzania. Records from Madagascar refer to *C. coronoleucas*, below.

**MATERIAL.** 48♂ (3 dissected, TM genitalia slides No. 974, 10851, 11176) and 34♀ (1 dissected, TM genitalia slide No. 10852). 1 Munich (ZSBS), 12 Nairobi (NMKE), 39 Pretoria (TM), 2 Cape Town (SAM), 8 Bulawayo (NMBZ), 4 C. Herbuleot collection, 12 N.J. Duke collection, 4 H.S. Staude collection.

**LOCALITIES.** **South Africa, KwaZulu-Natal:** Durban (8), Umdoni Park (4), Umhlanga Rocks (1), Umtentweni, Eden Park (4), Sarnia (6), Kloof (1), Pinetown (1), Dukuduku Forest (16), St. Lucia Bay (13). **Malawi:** Mkuwadzi Forest, Nkata Bay (6), Mt. Mlanje (1), Mt. Mlanje, Ruo Gorge (1). **Zimbabwe:** Vumba Mts (1), Aberfoyle, Honde Valley (2), Mt. Selinda (1). **Tanzania:** S., Usa (1), Amani (6). **Kenya:** Nairobi (2), Msambweni, Coast (1), Shimba Hills, Coast (2), Isiolo (4).

#### 50. *Chiasmia coronoleucas* (Prout, 1915) stat. et comb. n.

Figs 252; 634, 859

*Macaria natalensis coronoleucas* Prout, 1915a: 352.  
 Holotype ♀, [Madagascar]: Ambinanindrano, 50 km W. of Mahanoro, XI.1911 (G.K. Kestell-Cornish); NZ XXII p.352/*Macaria natalensis coronoleucas* Prout ♀ type; Rothschild Bequest B.M. 1939-1 (BMNH) [examined].  
*Semiothisa natalensis coronoleucas* (Prout); Herbule, 1956: 249; 1964: 254; 1972: 144.

FORE WING LENGTH. 12 mm (♂), 13 mm (♀).

ADULT (Fig. 252). Barely medium-sized. Apex of fore wings falcate; hind wings with a distinct tail. Ground colour of wings whitish, with dense ochreous suffusion and darker grey dusting. A row of whitish spots present along postmedian area of both wings. All three lines present on fore wing but faint; median line rather indistinct and more like a fascia. On hind wing, lines even weaker. Discal and interneuronal spots present but inconspicuous. Underside similar but ochreous suffusion with an orange hue. Postmedian area with rather extensive dark markings. Whitish dots present in postmedian area of hind wing and on apex of fore wing. Thorax and abdomen concolorous with wings. Hind tibia of ♂ dilated, bearing hair-pencil. Setal comb on A3 present.

MALE GENITALIA (Fig. 634). Uncus horns well developed; gnathos elongated. Tegumen narrow and elongated. Costa of valve somewhat pointed, forming a large, densely hairy spatula. Sacculus well rounded. Aedeagus short and stout; vesica with a complex arrangement of several groups of microcornuti. Octavals broadly arcuate, with a deep cleft between them.

FEMALE GENITALIA (Fig. 859). Papillae anales rounded. Both pairs of apophyses fairly delicate, a. anteriores barely half length of a. posteriores. Sterigma: l. antevaginalis forming a simple elliptical sclerotization; l. postvaginalis forming small sclerotizations on sides of antrum. Antrum shell-shaped, robust. Bursa copulatrix with short, ribbed ductus, widening abruptly into the large, elliptical corpus. Signum well developed, situated directly below centre of corpus bursae.

DIAGNOSIS. In facies, the species resembles *Chiasmia natalensis* and *C. fontainei* rather closely. Apart from the three species being allopatric, *C. coronoleucas* can be distinguished from its congeners by its much fainter markings; the interneuronal spots in particular are weakly developed. The differences in the genitalia can be seen from the illustrations.

BIOLOGY. Adults have been collected in February–March and October–December, mostly in forests at altitudes between 1000 and 1300 m.

DISTRIBUTION. Endemic to Madagascar, but apparently absent from the south.

MATERIAL. 25♂ (1 dissected, genitalia slide No. 3)

(MRAC) and 5♀ (1 dissected, genitalia slide No. 7) (MRAC). 14 London (BMNH), 14 Paris (MNHN), 2 Tervuren (MRAC).

LOCALITIES. **Madagascar:** Central, La Mandraka, 1230 m (7); Perinet, Analamazaotra (1), Perinet (2), Station Perinet (11), E., Anosibe road at km 52 (2), N., Diego Suarez (1), N., contreforts du Tsaratanana, Haut Sambirano, Besanetribe Valley, 1100 m (2), W., 100 km NE of Tulear, Analavelona Massive, forest at 1250 m (4).

### 51. *Chiasmia fontainei* (Fletcher, 1963) comb. n.

Figs 253, 254; 635, 860

*Semiothisa fontainei* Fletcher, 1963: 24. Holotype ♂, **Ivory Coast:** Bingerville, Sept[ember] 8–11 1915 (G. Melou); Rothschild Bequest B.M. 1939-1.; Geometridae genitalia slide No. 4320; *Semiothisa fontainei* Fletcher Holotype ♂ (BMNH) [examined]. Paratypes: 'allotype' ♀, **Ivory Coast:** *ibidem*, dated 25.V.–3.VI.1915; Geometridae genitalia slide No. 4321 (BMNH) [examined]. Further paratypes (44♂, 31♀): as listed in Fletcher, 1963: 25 (BMNH (Geometridae genitalia slides No. 4318, 4325, 4330–4335), MRAC, Coll. Institut des Parcs Nationaux du Congo et du Rwanda) [not examined].

FORE WING LENGTH. 12 mm (both sexes).

ADULT (Figs 253, 254). Ground colour of wings white, irregularly striated with pale yellow and densely dusted with olive. Postmedian area more or less wholly olive. Discal spots and all lines present but inconspicuous due to heavy markings. A group of four small, dark interneurals present along postmedian line on fore wing. Underside similar, appearing more whitish. Vestiture of thorax and abdomen ochreous-olive. Hind tibia of ♂ dilated. Seta comb on A3 present.

MALE GENITALIA (Fig. 635). Uncus horns well developed; gnathos normal. Valve rather short and compact. Costa spatulate, with pointed apex and tornus: sacculus medium-sized, rounded. Aedeagus somewhat fusiform and cleft apically; vesica with a smooth and a 'napped' cornutus, as well as a rugose area near tip. Octavals furcate, the tips pointing outwards.

FEMALE GENITALIA (Fig. 860). Papillae anales small and elliptical. Apophyses very thin, a. anteriores about half length of a. posteriores. Sterigma: l. postvaginalis forming a small, elliptical sclerotization on either side of the large, shell-shaped antrum. Ductus bursae broadest and with wrinkled appearance in posterior part, then narrower and gradually widening into the elongated corpus. Signum large, elliptical, situated near middle of corpus.

DIAGNOSIS. Externally, this species resembles dark

specimens of *Chiasmia natalensis*, above. For the differences in the genitalia see under that species. The two species appear to be allopatric, with *natalensis* primarily inhabiting coastal areas of southern and eastern Africa and *C. fontainei* occurring in West Africa, ranging southwards to Angola.

**BIOLOGY.** The species is associated with tropical forests. With the exception of March, adults have been observed in all months of the year; the recorded altitudinal range is 300–1500 m.

**DISTRIBUTION.** Predominantly west and central African in distribution (Principe I., Sierra Leone, French Guinea, Ivory Coast, Ghana, Nigeria, Cameroon, Ghana, Zaire); Angola (Fletcher, 1963). East Africa (Uganda).

**MATERIAL.** 9♂ (1 dissected, Geometridae genitalia slide No. 16125) (BMNH) and 8♀ (1 dissected, Geometridae genitalia slide No. 16126) (BMNH). 2 London (BMNH), 7 Berlin (ZMHB), 1 Munich (ZSBS), 1 Nairobi (NMKE), 6 C. Herbulot collection.

**LOCALITIES.** **Ivory Coast:** Yapo Sud, 22 km SSE. Agboville (3). **Cameroon:** Gendern, 4600 ft (1), Namieng nr. Lolodorf, Lokandje River (4), Lolodorf (1), Ngoko Station (1). **Nigeria:** Illesha (1). **Togo:** Bismarckburg (1). **Ghana:** Ashanti region, Kumasi-Kwadoso, 300 m (1). **Rep. of Congo:** env. Ouedou (3). **Uganda:** Fort Portal, Bwamba Forest, 2400 ft (1).

## 52. *Chiasmia threnopsis* (Fletcher, 1963) comb. n.

Figs 255–257; 636, 861; 1000

*Semiothisa threnopsis* Fletcher, 1963: 26. Holotype ♂, **Sierra Leone:** Moyamba (D. Cator); *Gonodela* [sic] *commixta* Warr. [misidentification]; Rothschild Bequest B.M. 1939–1; *Semiothisa threnopsis* Fletcher Holotype (BMNH) [examined]. Paratypes: ‘allotype’ ♀, **Sierra Leone:** Moyamba (D. Cator); *punctiversa* Warr. ♀ (smaller ab[erration]) [misidentification]; Rothschild Bequest B.M. 1939–1.; Geometridae genitalia slide No. 4343; *Semiothisa threnopsis* Fletcher Allotype (BMNH) [examined]. Further 77♂, 37♀ as listed by Fletcher, 1963: 27–28 [not examined].

**FORE WING LENGTH.** 12–14 mm (♂), 13–14 mm (♀).

**ADULT** (Figs 255–257). Medium-sized, with sombre appearance. Ground colour of wings whitish, densely irrorated with dark brown, particularly in postmedian area. Males on average darker than females. Hind wing with a rather pronounced ‘tail’. All lines and discal spots present but inconspicuous, dark brown. Underside: similar to upperside, less heavily marked and therefore appearing paler. Hind tibia of ♂ dilated. Setal comb on A3 present.

**MALE GENITALIA** (Fig. 636). Uncus horns large; gnathos normal. Valvae compact. Apex of spatula broadly rounded, tornus somewhat pointed; sacculus large and rounded. Aedeagus short and cleft apically; vesica with a single, needle-like median cornutus and several groups of microcornuti. Octavals arcuate, the tips pointing slightly outwards.

**FEMALE GENITALIA** (Fig. 861). Papillae anales medium-sized. Both pairs of apophyses thin and comparatively short, a. anteriores two-thirds length of a. posteriores. Sterigma fairly complex, produced posteriorly into two horn-like processes. Bursa copulatrix elongated, membranous except for ribbed posteriormost portion of ductus. Signum large.

**DIAGNOSIS.** This species bears some resemblance to 54. *C. conturbata*, below, but is mostly much darker. The white ground colour (ochreous in *conturbata*) also permits ready separation.

**DISTRIBUTION** (Fig. 1000). Widely distributed, particularly in West Africa (French Guinea, Sierra Leone, Liberia, Ivory Coast, Ghana, Nigeria, Cameroon, Gaboon, Angola). Further recorded from Central (Zaire, Congo Republic) and East Africa (Uganda, Kenya), reaching Malawi and southern Moçambique in the south. The latter specimen, listed below, constitutes a **new record** for southern Africa.

**BIOLOGY.** Like 51. *C. fontainei* and 54. *C. conturbata* an inhabitant of the tropical forests of West and Central Africa. Adults have been observed in all months except August.

**MATERIAL.** 23♂ (2 dissected, genitalia slide No. 22 (NMKE); Geometridae genitalia slide No. 16115) (BMNH) and 12♀ (2 dissected, genitalia slide No. 23 (NMKE); Geometridae genitalia slide No. 16116) (BMNH). 2 London (BMNH), 3 Munich (ZSBS), 1 Tervuren (MRAC), 4 Nairobi (NMKE), 6 Bulawayo (NMBZ), 19 C. Herbulot collection.

**LOCALITIES.** **Ivory Coast:** Yapo Sud, 22 km SSE. Agboville (4). **Cameroon:** Bitje, Ja River (1). **Ghana:** Opro River Reserve (3), Somahoo (1). **Zaire:** Lulua, Kapanga (1). **Rep. of Congo:** env. Ouesso (15). **Uganda:** Bundibugyo, Bwamba (1), Kampala (1), Kibale Forest, Toro (1), Tororo Forest (2), Entebbe (2). **Kenya:** Kakamega (1). **Moçambique:** Mussapa R[iver] Forest, Serra Rotanda (1). **Malawi:** Mt. Mlanje, Lujeri Tea Estates (1).

## 53. *Chiasmia crumenata* (Fletcher, 1963) comb. n.

Figs 258, 259; 637, 862

*Semiothisa crumenata* Fletcher, 1963: 26. Holotype ♂, **Cameroon:** Cameroons, Bitje, Ja River, 2000 f[ee]t,

Oct[ober]-Nov[ember] 1912, 1494; Joicey Bequest Brit. Mus. 1934-120; *Semiothisa crumenata* Fletcher Holotype ♂; Geometridae genitalia slide No. 16673 (BMNH) [examined]. Paratypes (12♂, 6♀). Examined 1♀, **Cameroon**: Lolodorf; Geometridae genitalia slide No. 16674 (BMNH).

FORE WING LENGTH. 12 mm (both sexes).

**ADULT** (Fig. 258, 259). Small to medium-sized. Ground colour of wings yellowish-ochre, densely striated with dark olivaceous brown (referred to as bister in original description); postmedian area predominantly of that colour. All three lines present on upperside, but indistinct; only postmedian relatively clear. Discal spots dark, more prominent on hind wing. Interneural spots present on both wings but not clearly developed. Underside similar. Hind tibia of ♂ very slightly dilated. Segment A3 lost in slide preparation examined.

**MALE GENITALIA** (Fig. 637). Uncus horns curved, prominent; gnathos normal. Costa of valve forming a narrow, apically pointed spatula. Sacculus well rounded. Aedeagus stout, cylindrical and cleft apically; vesica bearing a single median cornutus and several groups of microcornuti in apical half. Octavals broadly arcuate, semicircular.

**FEMALE GENITALIA** (Fig. 862). Papillae anales narrow and pointed. Apophyses moderately stout; a. anteriores approximately two-thirds length of a. posteriores. Lamella antevaginalis elliptical. Antrum well developed, flanked by small lateral sclerotizations of l. postvaginalis. Corpus bursae elongated, somewhat hourglass-shaped. Ductus bursae widest posteriorly, ribbed. Corpus bursae membranous, signum elliptical, very conspicuous.

**DIAGNOSIS.** In size and coloration most similar to *C. fontainei*, above. In comparison, *C. crumenata* is a more drab insect, with a darker postmedian area on the upperside and much less prominent interneural spots. In the male genitalia, the best diagnostic character is found in the shape of the octavals which are rather circular in *crumenata*. In the female, differences in the shape of the sterigma and the general shape of the bursa copulatrix permit ready separation of the two species (compare Figs 635, 637 and 860, 862).

**BIOLOGY.** Presumably an inhabitant of tropical forests like its close relatives. Adults have been collected in both the wet and dry season.

**DISTRIBUTION.** West and Central Africa, recorded from Cameroon, Gaboon, Ivory Coast, and Zaire (West Kivu Province).

**MATERIAL.** Only the holotype and one ♀ paratype were seen.

#### 54. *Chiasmia conturbata* (Warren, 1898) comb. n.

Figs 260-262; 638, 863

*Gonodela* [sic] *conturbata* Warren, 1898b: 251. LECTOTYPE ♀, here designated, [Nigeria]: Warri, IV.97 (Dr. Roth); Rothschild Bequest B.M. 1939-1.; Geometridae genitalia slide No. 4316; *Gonodela* [sic] *conturbata* Warr. ♀ Type (BMNH) [examined].

*Semiothisa conturbata* (Warren); Swinhoe, 1904: 324; Herboulot, 1954b: 324; Fletcher, 1958b: 131.

*Gonodela* [sic] *punctiversa* Warren, 1905b: 402. Holotype ♀, **Sierra Leone**: Moyamba, April [19]03 (D. Cator); *Gonodela* [sic] *punctiversa* Warr. ♀ Type; Geometridae genitalia slide No. 4339; Rothschild Bequest B.M. 1939-1 (BMNH) [examined].

*Gonodela* [sic] *punctiversa* Warren; Herboulot, 1954b: 324 (synonymy); Fletcher, 1958b: 131 (as synonym of *conturbata*).

FORE WING LENGTH. 12-14 mm (♂), 12-13 mm (♀).

**ADULT** (Figs 260-262). A medium-sized, sombre species. Ground colour of wings pale yellow, densely irrorated with dark brown, particularly in postmedian area. Basal and median line present, but inconspicuous. Postmedian line better developed, undulating. Discal spots weak. Underside: similar to upperside, but speckled with white, especially on hind wing. Thorax and abdomen brownish. Hind tibia of ♂ dilated. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 638). Uncus and tegumen strongly elongated. Uncus horns and gnathos well developed. Costa of valve straight, with a poorly developed spatula. Sacculus well rounded, lacking sclerotizations. Aedeagus moderately long and straight; vesica bearing a single median cornutus and exhibiting a finely spinose area near tip. Octavals arcuate, somewhat bell-shaped.

**FEMALE GENITALIA** (Fig. 863). Papillae anales narrow. Apophyses posteriores about two-thirds length of a. anteriores. Sterigma: l. antevaginalis not modified; l. postvaginalis forming small sclerotizations on sides of elongated antrum. Bursa copulatrix strongly elongated. Ductus bursae long, finely ribbed posteriorly. Corpus bursae also elongated. Signum very large, evenly rounded.

**DIAGNOSIS.** Similar to other dark members of the *trirecurva*-group, in particular *C. threnopis*. It can be recognized, however, by its ochreous ground colour (white in those species). The male genitalia are characterized by the weakly developed spatula.

**BIOLOGY.** Probably associated with tropical forests. Adults have been observed in May and June.

**DISTRIBUTION.** Predominantly West Africa (Cameroon, Nigeria, Ghana, Sierra Leone, Ivory Coast). Further inland in Congo Republic and Uganda. Fletcher

(1958b) further gives Principe Island, Zaire, Tanzania and Angola.

MATERIAL. 18♂ (1 dissected, Geometridae genitalia slide No. 16127) (BMNH) and 23♀ (2 dissected, Geometridae genitalia slide No. 16128) (BMNH); genitalia slide L 673 (NMBZ). 2 London (BMNH), 1 Berlin (ZMHB), 1 Munich (ZSBS), 2 Bulawayo (NMBZ), 13 Nairobi (NMKE), 22 C. Herbulot collection.

LOCALITIES. **Cameroon:** Johann-Albrechts-Höhe (1). **Nigeria:** Warri (1), Calabar (1). **Ghana:** Opro River Reserve (1); Gold Coast, Coomassie (= Kumasi) (1). **Sierra Leone:** Moyamba (1). **Uganda:** Bwamba Toro (2), Zika Forest, Entebbe (2), Entebbe (2), Bundibugyo, Bwamba (4), Bwamba (2), Bwamba Forest, Fort Portal, 2400 ft (1). **Ivory Coast:** Yapo Sud, 22 km SSE Agboville (20). **Rep. of Congo:** env. Oueso (2).

REMARKS. From the text it is apparent that Warren based his description of *Gonodela conturbata* on several specimens; however, only one of these syntypes, designated as lectotype above, was traced in BMNH.

### 55. *Chiasmia inquinata* sp. n.

Figs 263–265; 639, 864; 1003

TYPE MATERIAL. Holotype ♂, [South Africa, KwaZulu-Natal]: Zululand, Dukuduku Forest, 12.2.[19]80 (N.J. Duke); TM Lep[idoptera] Het[erocera] Genitalia slide No. 10994 (TM) [examined]. Paratypes (21♂, 18♀). [South Africa, KwaZulu-Natal]: 1♀, same data as holotype; 1♂, *ibidem*, dated 10.II.[19]80; 1♀ *ibidem*, dated 11.II.1980; 8♂♂, 1♀, *ibidem*, dated 4.–5.II.[19]89; 2♂♂, Zululand, St. Lucia, 2.II.[19]84 (N.J. Duke); 1♂, Durban, 4.I.[18]96/light; *Macaria confuscata* Warr. ♂ [in Warren's hand] [misidentification]; G[enitalia slide No.] 962. **Cape Province:** [Eastern Cape]: 1♂, The Haven, 11.I.1986, N.J. Duke leg.; TM Lep[idoptera] Het[erocera] Genitalia slide No. 11141 (TM). **Zimbabwe:** 1♂, (S[outhern] Rhodesia), Vumba, 11.IX.1963 (B.D. Barnes); 1♀, *ibidem*, dated 8.XII.1961 (B.D. Barnes); genitalia slide L 658 (NMBZ); 1♀, Bunga Forest, Vumba, c.19°10'S 32°45'E, 16.–18.I.1992, M. Krüger legit; 1♀, Vumba, Laurenceville, –6.–12.III.1964 (Vári & van Son); 1♂, Vumba, dated 7., 10.III.1976 (M.J. Scoble); Mt. Selinda: 1♂, 1♀, 9.–17.IV.1956 (van Son & Vári); 1♀, 10.II.1963 (van Bruggen); 1♀, Aberfoyle, Honde Valley, 18.X.[19]90 (N.J. Duke), 4♀, *ibidem*, dated 26.IV.[19]93. **Moçambique:** 1♀, Maronga Forest, 6.–11.IX.1972 (R.H. Jones); TM Lep. Het. Genitalia slide No. 10846; 1♀, Moribane Forest, 6.–11.IX.1972 (R.H. Jones); TM Lep. Het. Genitalia

slide No. 10847. **Cameroon:** 1♂, S. Cameroon, 26.3.[19]20. **Kenya:** 3♂, 1♀, Nderema, VI.1936 (G. v.Son) (TM). **[Tanzania]:** 1♂, 1♀, (Deutsch Ost Afrika), Tendaguru, Bez[irk] Lindi, iv–vi 1909 [♂ undated] (Janensch S.O.); genitalia slides M. Krüger No. 7, 8 (ZMHB); 1♀, Tanganyika sept[entrionalis], Mt. Meru, Momella, 1600–1800 m, 1.–10.ii.[19]64, leg[it] W. Forster, Staatss[amm]l[un]g München (ZSBS, ZMHB, TM, N.J. Duke collection).

*Semiothisa confuscata* (Warren) *sensu* Janse, 1932: 212 (*paritum*).

FORE WING LENGTH. 14 mm (♂), 13–14 mm (♀).

ADULT (Figs 263–265). A very sombre species of dirtyish appearance. Ground colour whitish-grey, densely irrorated with dark brownish-grey, particularly postmedian areas. Lines hardly discernible in dark specimens, postmedian somewhat clearer. Discal spots poorly defined. Preapical spot well developed, dark brown. Underside: basal and median areas whitish, densely speckled with greyish brown; median line and discal spots contrasting clearly. Postmedian area with a broad, greyish-brown to brown irregular fascia. A conspicuous, large, elliptical spot near anal angle on hind wing. Thorax and abdomen concolorous with wings, somewhat paler on underside. Hind tibia of ♂ dilated. Seta comb on A3 present.

MALE GENITALIA (Fig. 639). Uncus horns long; gnathos inconspicuous, with slender arms. Valve densely hairy and rather stout, spatula fairly weakly developed. Sacculus rounded, forming a short distal projection. Aedeagus small relative to size of remainder of genitalia. Vesica bearing a single needle-like cornutus and several groups of microcornuti close to apex. Octavals furcate, with knob-like tips.

FEMALE GENITALIA (Fig. 864). Papillae anales small. Both pairs of apophyses slender, a. posteriores about twice length of a. anteriores. Sterigma: l. postvaginalis fairly complex. Antrum typical for the group, of medium size. Ductus bursae not particularly long, densely ribbed posteriorly. Corpus bursae elongated, signum medium-sized.

EARLY STAGES. Egg: length 0.45 mm, width 0.35 mm, pale green, but darkening prior to hatching of larva. Shape as in other species of *Chiasmia*; sculpture weakly developed. Larva. First instar: length 1.25 mm, width 0.18 mm. Head: width 0.2 mm, light brown, ocelli darker. Body: thoracic segments of a dirtyish yellow, A1–2 fairly dark green, A3–10 yellowish-green. Thoracic and abdominal legs yellowish-green. The larvae failed to accept the offered foodplants, so that no further description is available.

DIAGNOSIS. Very similar to *C. insulicola*, below, from which it can only be separated by examination of the genitalia. The males are best separated by the aedeagi

(cleft in *insulicola*, entire in *inquinata*). The female genitalia of *insulicola*, while similar, are more robust (apophyses slightly stouter, with a wider antrum and sterigma and a broader corpus bursae). Distributional data are also important, since the two species are allopatric, *insulicola* being restricted to Madagascar and *inquinata* occurring on the African mainland. Another similar species is 38. *C. confuscata*, above, which, however, lacks the pronounced preapical spot on the fore wing.

**BIOLOGY.** The species is associated with mountainous and lowland subtropical and tropical forests. Adult specimens were collected from January to March and in September.

**DISTRIBUTION** (Fig. 1003). In West Africa only a single record from Cameroon. Widely distributed in East (Uganda, Tanzania, Kenya) and eastern parts of southern Africa (Malawi, Moçambique, Zimbabwe and KwaZulu-Natal and Transvaal provinces in South Africa). In the southern parts of its range either coastal (KwaZulu-Natal) or inhabiting mountainous areas (Transvaal, Zimbabwe).

**FURTHER MATERIAL.** 22♂ (1 dissected, TM genitalia slide No. 11270) and 27♀. 1 Pretoria (TM), 48 Bulawayo (NMBZ).

**LOCALITIES.** **Cameroon:** Lomié (4). **Uganda:** Zika Forest/Entebbe (5), Entebbe (3). **Zimbabwe:** Vumba Mts (11), Mt. Selinda (2), Busi Farm, Chipinga (1). **Moçambique:** Chiluvo Hills (3), Serra Rotanda, E. of Chimanimani Mts (10), Mussapa River Forest, Serra Rotanda (6), Dombe (1), Dondo Forest/Dondo (1). **South Africa, Northern Province:** Zoutpansberg, Cloud's End (1). **Malawi:** Mt. Mlanje, Lujeri Tea Estates (1).

**ETYMOLOGY.** From Latin *inquino*, to become soiled; on account of the untidy appearance of the moth.

**REMARKS.** The ♂ paratype from Durban (TM genitalia slide No. 962) was erroneously determined as *C. confuscata* and the genitalia illustrated by Janse (1932).

## 56. *Chiasmia insulicola* sp. n.

Figs 266–268; 640, 865

**TYPE MATERIAL.** Holotype ♂, [Madagascar]: Station Perinet, 149 km east of Tananarivo, January 1933 (Mme. N. d'Olsoufieff); Rothschild Bequest B.M.1939-1 (BMNH). Paratypes (5♂, 8♀). **Madagascar:** 1♀, *ibidem*, dated December 1932; Geometridae genitalia slide No. 16960 (BMNH); 1♂, Perinet, Analamazaotra, 11/19.II.1955 (C. Herbolut); genitalia slide C. Herbolut No. 6609; 2♂, 3♀, *ibidem*, dated 23.XII.1954 (♀), 26.XI.1954 (♀), 24.XII.1954 (♀),

14.I.1955 (♂), 15.I. 1955 (♂) (P. Viette); 1♀, *ibidem*, 8.X.1955 (P. Griveaud et R. Vieu); 2♂, Est, Marojejy, rés[erve] nat[urelle] int[égrale] XII, Ambatosoratra, 1000 m, VIII–1960 (P. Soga); 1♀, Est, 6 km N.O. Fanovana, Italaviana, 730 m, II/1955 (P. Griveaud et R. Vieu); 1♀, Est, route d'Anosibe km 52, 1.I.1957 (P. Griveaud et R. Vieu); 1♀, Est, Baie d'Antongil Presqu'île Masoala Hiaraka, 500 m, 15/17.X.1968 (P. Griveaud, A. Peyrieras et P. Viette) (MNHN, BMNH, C. Herbolut collection).

**FORE WING LENGTH.** 14–15 mm (♂), 13–14 mm (♀).

**ADULT** (Figs 266–268). Very similar to *C. inquinata*, above. In both species, the males are markedly darker. For a description, see under *C. inquinata*. Hind tibia of ♂ dilated, with hair pencil. Setal comb on A3 present.

**MALE GENITALIA** (Fig. 640). Uncus horns prominent, well sclerotized; gnathos normal. Valve robust. Costa forming a broad spatula; sacculus rounded, with a narrow sclerotized band running along distal margin. Tegumen/vinculum rounded, slightly ovoid. Aedeagus approximately cylindrical, deeply cleft. One long, needle-like median cornutus and an apical group of microcornuti on vesica. Octavals furcate, tips rounded, pointing inwards.

**FEMALE GENITALIA** (Fig. 865). General appearance robust. Papillae anales well developed, elliptical. Apophyses moderately stout and relatively short, a. anteriores about two-thirds length of a. posteriores. Sterigma: sclerotizations of l. postvaginalis large, connected by a bar across base of antrum. Antrum prominent, shell-shaped. Bursa copulatrix irregularly pyriform; ductus short and densely ribbed. Signum fairly small, situated near base of corpus bursae.

**DIAGNOSIS.** See under *Chiasmia inquinata*, above.

**BIOLOGY.** The species is partial to the rainforests of the eastern part of Madagascar where it occurs at altitudes from 500–1000 m. Adults have been collected in October and December–February.

**DISTRIBUTION.** Endemic to Madagascar.

**ETYMOLOGY.** From Latin *insula* (-ae), an island, and *colo*, to inhabit; the species is confined to Madagascar.

## 57. *Chiasmia feraliata* (Guenée, [1858]) comb. n.

Figs 269–271; 641, 866; 1004

*Macaria feraliata* Guenée, [1858]: 88. Holotype ♂, [Sine patria]: Ex Musaeo Achille Guenée; Typicum specimen; *Macaria feraliata*, Guenée Sp[ecies] G[enera] X No.1661, Boîte 236; Ex Oberthür Coll. Brit. Mus. 1927.–3; [illustration cut from plate]; *Feraliata* Gn. (BMNH) [examined, abdomen missing].

*Macaria elata* Prout, 1916a: 175. Holotype ♀, [South Africa, KwaZulu-Natal]: Natal (Clark); *Macaria elata* Prout, Type No. 2207, = *S. feraliata* Guen[ée] (TM) [examined]. **Syn. n.**

*Macaria elata* Prout; Janse, 1917: 113.

*Macaria feraliata* Guenée; Janse, 1917: 113; LeCerf, 1922: 443; Oberthür, 1923: 245.

*Semiothisa elata* (Prout); Janse, 1932: 211.

*Semiothisa feraliata* (Guenée); Janse, 1932: 234; Prout, 1932a: 493; Herbulot, 1954b: 325; Fletcher, 1963: 28; 1978a: 81.

FORE WING LENGTH. 16–18 mm (both sexes).

**ADULT** (Figs 269–271). A large species of very sombre aspect. Fore wings rather narrow, hind wings broad, with a rather pronounced 'tail'. Ground colour of wings whitish, very densely clouded and irrorated with purplish-grey, especially in postmedian area. Apex of fore wings with a whitish spot. Lines also dark purplish-grey, but basal and median lines not well defined. Discal spots inconspicuous. Underside: basal and median areas whitish, densely irrorated with fuscous brown, basal and median lines more like fasciae; postmedian area nearly uniformly fuscous brown with faint whitish markings only on apex of fore wing and near anal angle of hind wing. Discal spots inconspicuous. Thorax and abdomen greyish. Hind tibia of ♂ dilated, bearing hair-pencil. Setal comb on A3 present.

**MALE GENITALIA** (Fig. 641). Uncus horns well developed; gnathos rather long. Valves large and strongly elongated. Spatula of costa narrow; sacculus small, rounded, forming a small distal projection. Aedeagus small relative to rest of genitalia, acutely pointed. Vesica bearing a single, not well defined apical cornutus and some indistinct microcornuti near apex. Octavals furcate, acutely pointed.

**FEMALE GENITALIA** (Fig. 866). Papillae anales narrow. Apophyses anteriores rather more than two-thirds length of a. posteriores. Position of ostium indicated by a broad slit, sterigma not modified. Antrum wide. Bursa copulatrix stout, pear-shaped and cleft apically. Signum large and elliptical.

**DIAGNOSIS.** Similar to 91. *C. ostentosaria*, below, and its close relative 95. *C. albivia* but easily recognized by its very dark coloration and black-and-white underside markings. The differences in genitalia structure are apparent from the illustrations.

**BIOLOGY.** *Chiasmia feraliata* is associated with tropical and subtropical forest. In KwaZulu-Natal, adult specimens were collected from January to April and again in November and December.

**DISTRIBUTION** (Fig. 1004). Widely distributed in West (Ivory Coast, Liberia, Nigeria, Cameroon, Dahomey, Angola) and East Africa (Tanzania, Kenya,

Uganda). In Central Africa recorded from the Congo Republic. In southern Africa mostly in coastal areas of northern KwaZulu-Natal (Zululand), with isolated inland records from the Transvaal and eastern Zimbabwe.

**MATERIAL.** 145♂ (6 dissected, TM genitalia slides No. I397, 10823, 11124, 11125; NMBZ genitalia slide No. L645, SAM slide No. SAM 9B17) and 73♀ (2 dissected, TM genitalia slide No. 10824; genitalia slide L 645 (NMBZ)). 2 Paris (MNHN), 2 Berlin (ZMHB), 4 Munich (ZSBS), 79 Pretoria (TM), 2 Cape Town (SAM), 30 Nairobi (NMKE), 68 Bulawayo (NMBZ), 8 C. Herbulot collection, 15 N.J. Duke collection, 8 H.S. Staudt collection.

**LOCALITIES.** **South Africa, KwaZulu-Natal:** St. Lucia (30), Dukuduku Forest (36), Mtubatuba (3), Hluhluwe (1), Jozini Dam, Lebombo Mountains (1), Durban (6), Port Shepstone (1), Karkloof (1), Eshowe (2), Mkuze (1), Sordwana Bay (1), Maphelana (6).

**Transvaal:** [Mpumalanga]: Penge, Lydenburg District (1), Pongola (1), Skukuza (1) [Northern Province]; Selati (1). **Zimbabwe:** Murahwa's Hill (1), Vumba (14), Laurenceville, Vumba (1), Busi Farm, Chippinga (3), Mt. Selinda, Melsetter (5), Chikwarakwara (2), Aberfoyle, Honde Valley (4). **Moçambique:** no further data (1), Chiluvo Hills (3), Serra Rotanda, E. of Chimanimani Mts (23), Dombe (1), Mussapa River Forest, Serra Rotanda (10). **Angola:** NW., Prov. Nordcuanza, Canzele, 30 km N. Quicolongo (1).

**Kenya:** Nairobi (1), Coast, Shimba Hills (8), Namanga Hills, Taita (2), Voi (1), Kakamega (2), Nderema (4), Lower Imenti Forest, 5000' (1). **Tanzania:** Morogoro (4), Mt. Meru, 1600–1800 m (1), Oldeani (1), Amani (4). **Uganda:** Namutere Forest, Busia (3), Mabira Forest, Jinja (1), Bwamba Toro (6), Zika Forest, Entebbe (2). **Cameroon:** Hinterland, Jaunde Station (1), Namiong/Lolodorf, Lokundje River (1). **Nigeria:** E., Ikrom (1). **Liberia:** Grassfield, Nimba (2). **Dahomey:** no further data (2). **Rep. of Congo:** 5, 15 km SW. Oueso (6). **Ivory Coast:** Yapo Sud, 22 km SSE. Agboville (2).

## 8. *Chiasmia amarata*-group

This group includes 20 small to large, but mostly medium-sized species of generally sombre coloration. The fore wings are relatively narrow, while the hind wings show a pronounced 'tail' in most species. The antennae are simple and ciliate in both sexes, though slightly thicker in the male. Although there exists some variation, especially pertaining to the absence or presence of a process on the costa and the sacculus, valve shape is an autapomorphy for the group. The group is most diverse in eastern Africa and many species appear to prefer forested habitats; not surprisingly, therefore, there are also a number of species confined to West Africa.

MALE GENITALIA (Figs 642–658). Uncus horns fairly small to well developed; gnathos delicate even in the large species, with thin arms. Costa of valve with or without ventral processes, straight and with apex not dilated. Sacculus in most species squarish, occasionally apex produced into short, drooping process; sclerotizations mostly absent; if present, these are confined to tip. Aedeagus small relative to size of genitalia, typically somewhat fusiform; vesica frequently lacking cornuti and merely displaying some striations. Octavals of most species quite shallow, with well-rounded tips.

FEMALE GENITALIA (Figs 867–883). Papillae anales and apophyses as described for the genus and not showing modifications. Sterigma: lamella antevaginalis mostly unmodified; l. postvaginalis forming characteristic ear-like chitinizations on sides of antrum in a number of species. Antrum well developed, usually appearing extended. Bursa copulatrix also generally elongated, pyriform to tubular. Signum rounded to elliptical, very rarely absent (75. *C. geminilinea*).

## Key to species

- 1 Very small moths (fw length 12 mm) with rounded hind wings and rather obscure markings (Figs 278, 279). ♂ unknown. ♀ genitalia (Figs 868, 869) with fairly large and pointed antrum. Restricted to Kenya ..... 2
- Larger moths or, if of similar size, much darker in coloration (Figs 272–277, 280–313). ♀ genitalia not as above (Figs 867, 870–883). Throughout the study area ..... 3
- 2(1) Adult as in Fig. 278. ♀ genitalia (Fig. 868) with fairly small, elliptical corpus bursae; ductus ribbed but not particularly sclerotized ..... 60. *evansi* sp. n., p. 173
- Adult as in Fig. 279. ♀ genitalia (Fig. 869) with large, rounded corpus bursae; ductus bursae rather well sclerotized ... 61. *kilifi* sp. n., p. 174
- 3(1) Small, very dark moths (fw length 11–13 mm) (Figs 305–308), underside black-and-white ... 4
- Moths mostly larger, not marked as above .... 5
- 4(3) Moths practically totally black on both sides of wings (Figs 307, 308). ♂ and ♀ genitalia as in Figs 656, 880. Uganda to Tanzania; Zaire; Cameroon ..... 74. *subcretata* (Warren), p. 182
- Moths lighter on both sides (Figs 305, 306). ♂ genitalia as in Fig. 655. ♀ unknown. Angola, Cameroon, Ghana ..... 73. *angolae* (Bethune-Baker), p. 181
- 5(3) Costa of valve straight, lacking even small ventral process (Figs 642–645). ♀ genitalia, where known, as in Figs 867, 870 ..... 6
- Costa with poorly (e.g., Fig. 654) to well devel-
- oped ventral process (e.g., Fig. 649). ♀ genitalia not as above ..... 9
- 6(5) Fairly small moths (fw length 13–14 mm) with pointed fore wings (Figs 276, 277). ♂ genitalia (Fig. 643) lacking cornuti on vesica. ♀ unknown. Kenya ..... 59. *acutiapex* sp. n., p. 173
- Slightly or markedly larger moths (fw length 12–17 mm) but if of similar size then fore wing apex less pointed (Figs 272–275, 280–282). Male genitalia (Figs 642, 644, 645) not as above. Throughout the study area, including Kenya... ..... 7
- 7(6) Slightly larger moths (fw length 15–16 mm) with less pointed fore wings (Figs 280, 281). ♂ genitalia (Fig. 644) with short, small median cornutus on vesica and broad sacculus. ♀ genitalia (Fig. 870) similar to other members of the group, antrum and lateral sclerotizations slender. Kenya, Tanzania ..... 62. *simplex* sp. n., p. 174
- Smaller to larger moths (fw length 12–17 mm) (Figs 272–275, 282). Male and female genitalia not as in Figs 644, 870 ..... 8
- 8(7) Predominantly greyish moths with rather weak postmedian line (Figs 272–275). ♂ genitalia (Fig. 642) with massive costa and short, button-like octavals. ♀ genitalia (Fig. 867) elongated, with prominent, ear-like sterigma. North-eastern Cape Province to Moçambique, coastal; the more ochreous ssp. *choica* (Prout) (Fig. 275) in Kenya and Tanzania ..... 58. *amarata* (Guenée), p. 171
- Moths olive-grey with strongly developed postmedian line (Fig. 282). ♂ genitalia (Fig. 645) with costa less massive and more deeply emarginate octavals. ♀ unknown. Kenya ..... 63. *cararia* (Swinhoe), p. 175
- 9(5) Costa with short, blunt ventral process and more or less rounded sacculus (Figs 647, 648). ♀ genitalia as in Figs 872, 873. KwaZulu-Natal coast (one species) and Madagascar (one species) ..... 10
- Male genitalia not as in Figs 670, 648 and female genitalia not as in Fig. 872, 873. Absent from Madagascar; most species not reaching South Africa ..... 11
- 10(9) Moths small (fw length 12 mm) and fairly dark (Figs 289, 290). ♂ genitalia (Fig. 648) with somewhat square sacculus and very short aedeagus. ♀ genitalia (Fig. 873) with ductus bursae only slightly shorter than corpus; antrum lacking lateral sclerotizations. Madagascar ..... 66. *megalesia* (Vieite), p. 177
- Moths slightly larger (fw length 12–15 mm), light grey (Figs 286–288). ♂ genitalia (Fig. 647) with rounded sacculus and relatively longer aedeagus. ♀ genitalia (Fig. 872) pear-shaped,

- i.e., ductus bursae much shorter than corpus; antrum with small lateral sclerotizations. Kwa-Zulu-Natal (incl. Transkei) ..... 65. *duplicilinea* (Warren), p. 176
- 11(9) Fairly large species (fw length 14–17 mm) (Figs 300–303). ♂ genitalia with large valvae; costa with a short and broad ventral process (Figs 652, 653). ♀ genitalia (Figs 877, 878) with horn-like, recurved sterigma ..... 12
- Small to large moths but not marked as above (Figs 283–285, 291–299, 304, 309–313). ♂ and ♀ genitalia not as in Figs 652, 653 and 877, 878 ..... 13
- 12(11) Larger moths (fw length 15–17 mm) (Figs 300–302). ♂ genitalia (Fig. 652) with a well developed, sigmoid sclerotized band across sacculus. ♀ genitalia (Fig. 877) with processes of sterigma horn-like. East Africa (Moçambique to Uganda) ..... 70. *orientalis* sp. n., p. 179
- Smaller moths (fw length 14–15 mm) (Fig. 303). ♂ genitalia (Fig. 653) lacking sclerotized band across sacculus. ♀ genitalia (Fig. 878) with processes of sterigma well rounded. West (Cameroon, Ivory Coast) and east Africa (Uganda, Kenya) ..... 71. *trigonoleuca* (Herbulot), p. 180
- 13(11) ♂ genitalia with costa bearing short, pointed ventral process and sacculus not drawn into drooping process (Figs 649–651). ♀ genitalia as in Figs 874–876 ..... 14
- ♂ genitalia, where known, with costa bearing short, blunt ventral process and sacculus forming a drooping process of varying length (Figs 646, 654, 657, 658). ♀ genitalia as in Figs 871, 879, 881–883 ..... 16
- 14(13) Grey species (Figs 291–293). Costa of valve dilated apically; octavals relatively widely separated (Fig. 649). ♀ genitalia (Fig. 874): bursa copulatrix elongated, tubular. West to East Africa (Guinea, Cameroon, Zaire, Uganda) ..... 67. *unigeminata* (Prout), p. 177
- Ochreous species (Figs 294–299). Costa of valve not or only weakly dilated apically; octavals close together (Figs 650, 651). ♀ genitalia (Figs 875, 876) pear-shaped or, if elongated, less strongly so. Tanzania and Kenya ..... 15
- 15(14) Adults as in Figs 294–296. ♂ genitalia (Fig. 650) with slender aedeagus; vesica bearing a single cornutus. ♀ genitalia (Fig. 875) elongated. Tanzania and Kenya ..... 68. *costiguttata* (Warren), p. 178
- Adults as in Figs 297–299. ♂ genitalia (Fig. 651) with stout aedeagus; vesica lacking cornuti. ♀ genitalia (Fig. 876) pear-shaped (association of the ♀ doubtful). Tanzania and Kenya ..... 69. *kenyae* sp. n., p. 179
- 16(13) Light grey moths with conspicuous black interneurals (Fig. 304). Ventral process of costa very small; sacculus forming a short, drooping process (Fig. 654). ♀ genitalia as in Fig. 879. West to East Africa (Ivory Coast, Cameroon, Liberia, Uganda) ..... 72. *plutocrypsis* (Herbulot), p. 181
- Moths differently marked (Figs 283–285, 309–313). Processes of costa and sacculus longer. ♀ genitalia not as in Fig. 879. Widely distributed, but most species in southern and eastern Africa ..... 17
- 17(16) Grey species, resembling *C. amarata* in facies (Figs 283–285). ♂ and ♀ genitalia as in Figs 646, 871. Transvaal, Moçambique and Zimbabwe; Tanzania ..... 64. *deceptrix* sp. n., p. 175
- Large and brown or smaller, paler moths (Figs 309–313). ♂ and ♀ genitalia not as in Figs 646, 871. Distribution overlaps in Zimbabwe ..... 18
- 18(17) Large, brown species with dark preapical spot and prominent interneurals (Figs 312, 313). ♂ genitalia (Fig. 658) with conspicuously elongated valvae; ♀ genitalia (Fig. 883) with elaborate sterigma. Widely distributed in Afrotropical region, reaching Zimbabwe in the south ..... 77. *subvaria* (Bastelberger), p. 183
- Smaller, paler moths (Figs 309–311). ♂ and ♀ genitalia not as in Figs 658, 883. Zimbabwe to Rwanda (1 species); Ethiopia (1 species) ..... 19
- 19(18) Moths with conspicuous blackish marks in postmedian area of hind wing (Figs 309, 310). ♂ genitalia as in Fig. 657. ♀ genitalia (Fig. 881) lacking signum. Zimbabwe to Rwanda ..... 75. *geminilinea* (Prout), p. 182
- Moths as in Fig. 311, without such marks. ♂ unknown. ♀ genitalia (Fig. 882) with signum present. Ethiopia ..... 76. *abyssinica* sp. n., p. 183
- 58. *Chiasmia amarata amarata* (Guenée, [1858]) comb. n.**
- Figs 272–274; 642, 868; 1005
- Macaria amarata* Guenée, [1858]: 88. Holotype ♂, Brazil [ex errore]; Ex Musaeo Ach[ille] Guenée; Typicum Specimen; Ex Oberthür Coll. Brit. Mus. 1927–3; *Macaria amarata* Guenée Sp[ecies] G[énéral] X No. 1060; [figure apparently cut from plate] (BMNH) [examined].
- Macaria lataria* Walker, 1861: 921. Holotype ♀, [South Africa, KwaZulu-Natal]: Durban (P[or]t Natal)/58 13; 95. *Macaria lataria*; Geometridae genitalia slide No. 3605 (BMNH) [examined].
- ?*Macaria catalenuaria* Mabille, 1897: 229. Type material: not stated, but at least 2 syntypes. [Moçambique]: Delagoa, Zanquebar [hist. E. Afr. Seaboard] [lost]

- (Viette & Fletcher, 1968)] [not examined].  
*Semiothisa lataria* (Walker); Swinhoe, 1904: 504;  
 Fawcett, 1916: 727.  
*Gonodela* [sic] *leighi* Warren, 1904: 478. Holotype ♀,  
 [South Africa, KwaZulu-Natal]: Durban, Natal  
 (G.F. Leigh); Rothschild Bequest B.M.1939-1.;  
 Geometridae genitalia slide No. 3606; XI.478.  
*Gonodela* [sic] *leighi* Warren ♀ type (BMNH) [ex-  
 amined].  
[*Gonodela* [sic] *amaradata* (Walker); Warren, 1904:  
 478. Misspelling of *amarata* Guenée.]  
*Macaria lataria* Walker; Hampson, 1910: 468; Prout,  
 1932a: 490; Janse, 1917: 113 (as good species);  
 1932: 218 (synonymy).  
*Macaria cataleucaria* Mabille; Janse, 1917: 113 (as  
 good species); 1932: 218, 234 (synonymy).  
*Macaria leighi* (Warren); Janse, 1917: 114 (as good  
 species).  
*Semiothisa amarata* (Guenée); Janse, 1932: 218.  
*Gonodela* [sic] *leighi* Warren; Janse, 1932: 218, 234  
 (synonymy).

FORE WING LENGTH. 14–15 mm (♂), 14–16 mm (♀).

ADULT (Figs 272–274). Ground colour of wings whitish, irrotated with grey, but sometimes appearing more ochreous. ♀ larger than ♂, with broader wings. Tail on hind wing more pronounced in ♂. All lines present, but only postmedian line well developed in most specimens. Discal spots black, inconspicuous. Postmedian area darker grey, with some black maculae present on postmedian line of fore wing and, occasionally, near anal angle of hind wing. Preapical spot chestnut-brown. Underside whitish, thickly striated with grey. Discal spots and median line mostly prominent, postmedian area dark grey, mixed with brown; some whitish blotches near termen of both wings. Thorax and abdomen grey. Hind tibia of ♂ dilated. Setal comb on A3 present.

MALE GENITALIA (Fig. 642). Uncus horns well developed; gnathos rather weak. Valva elongated; costa nearly straight, without process; sacculus large, with a small elliptical sclerotization. Aedeagus medium-sized, slightly fusiform and exhibiting a weak serration below tip; vesica carrying a long, needle-like apical cornutus. Octavals resembling a figure of eight.

FEMALE GENITALIA (Fig. 867). Papillae anales fairly narrow. Apophyses slender, a. anteriores rather more than two-thirds length of a. posteriores. Sterigma: l. antevaginalis not modified; l. postvaginalis forming two elongated, pointed 'ears' on sides of the shell-shaped antrum. Bursa copulatrix strongly elongated; ductus ribbed, widening slightly into tubular corpus. Signum small.

DIAGNOSIS. Similar to 64. *C. deceptrix* and 65. *C. duplicitinea*. However, in the male genitalia these spe-

cies possess a ventral process on the costa of the valve which is absent in *amarata*. In the female, the shape of the sclerotizations of the sterigma offer the best diagnostic characters (compare Figs 867, 871, 872). In addition, distributional data are an aid to identification: only *C. duplicitinea* is sympatric with *amarata*, both being coastal species, while *deceptrix* is only found further inland, with records from the eastern Transvaal, eastern Zimbabwe, Moçambique and Tanzania.

BIOLOGY. In southern Africa, the species inhabits subtropical forests along the KwaZulu-Natal coast and probably ranges into Moçambique; there are no records from further inland. Adults have been collected throughout the year with the exception of June.

DISTRIBUTION (Fig. 1005). The nominate subspecies occurs along the coast of KwaZulu-Natal and Moçambique between 26° and 33°S.

MATERIAL. 38♂ (4 dissected, TM genitalia slides No. 972, 11130, 11131, 11137) and 50♀ (5 dissected, TM genitalia slides No. 10837, 11133–11135, 11140). 2 London (BMNH), 4 Paris (MNHN), 74 Pretoria (TM), 5 N.J. Duke collection, 3 H.S. Staude collection.

LOCALITIES. South Africa, KwaZulu-Natal: Dukuduku Forest (13), St. Lucia (6), Cape Vidal (1), Kosi Lake (1), Mtubatuba (2), Zululand (1), Tongaat (6), Illovo Beach (1), Illovo River (1), Eshowe (1), Durban (21), Burman's Bush (1), Stella Bush (5), Magude (2), Mkuzi (4), Umkomaas (1), Umhlanga Rocks (5), Krantzkloof (1), Umhlali (1), Kulene, Hluluhwe (2), Amahlongwa (1), Sordwana Bay (2), Maphelana (2). Cape Province: [Eastern Cape]: Beacon Bay (1). Moçambique: (Lourenço Marques) Maputo (2), Delagoa Bay (4).

#### 58a. *Chiasmia amarata choica* (Prout, 1932) comb. n.

Fig. 275

*Semiothisa amarata choica* Prout, 1932a: 490.  
 Holotype ♂, [Kenya]: Type; Afr[ique] or[ientale]  
 angl[aise] (Wa-Taita), Bura (Alluaud & Jeannel),  
 Mars 1912, 1050 m, St. 61; *Semiothisa amarata*  
*choica* Prout, Mém[oires] [de la] Soc[iété]  
 ent[omologique] [de] France 1932, 26, p.490 (P.  
 Viette, Mai 1951 (MNHN) [examined].

DIAGNOSIS. ADULT (Fig. 275). This subspecies is said in the original description (here translated from the French) to be 'in general rather less ample-winged than nominotypical *amarata*, almost invariably more densely dark-dusted, especially in the males, which often in consequence appear quite indistinctly marked; median shade generally developed, postmedian line of fore

wing rather more irregular posteriorly (inclined to bend inward at fold, outward at SM); distal area beneath, at least in the males, less sharply marked, the pale patches reduced or partly dark-dusted'. *Chiasmia a. choica* is ochreous, rather than grey, in general appearance.

DISTRIBUTION. Kenya and Tanzania.

MATERIAL. 2♀. 1 London (BMNH), 1 Nairobi (NMKE).

LOCALITIES. [Tanzania]: Mwanza (1). [Kenya]: (British East Africa), Kibwezi (1).

### 59. *Chiasmia acutiapex* sp. n.

Figs 276, 277; 643

TYPE MATERIAL. Holotype ♂, **Tanzania**: Africa, Tanzania, Usa River, 3900 ft., IX–II.1965–66, leg[it] Dr J. Szunyoghy; Brit. Mus. 1978–107 (BMNH). Paratypes (2♂). **Tanzania**: 1♂, same data as holotype; Geometridae genitalia slide No. 16961 (BMNH); 1♂, **Kenya**: Nairobi, May 1964 (R.H. Carcasson); genitalia slide M. Krüger No. 27 (NMKE).

FORE WING LENGTH. 13–14 mm (♂).

ADULT ♂ (Figs 276, 277). Rather small. Antennae shortly ciliate; apex of fore wing acutely pointed. Ground colour of wings cream white to ochreous, densely striated with light grey; postmedian area with additional grey suffusion. Some dark spots present in postmedian area of both wings. Basal and median line faint and indistinct; postmedian better developed, acutely angled below costa of fore wing. Discal spots indistinct. Preapical spot present but faint; interneurals present. Underside whitish mixed with ochreous, with intense darker striation; postmedian area predominantly greyish-brown with lighter blotches along termen. Discal spots absent. Thorax and abdomen concolorous with wings. Hind tibia of ♂ moderately dilated, bearing hair pencil. Seta comb on A3 present.

MALE GENITALIA (Fig. 643). Uncus horns medium-sized; gnathos delicate. Costa of valve straight, not dilated at apex and lacking ventral process. Sacculus angular, slightly more than twice width of costa; apex bearing a small, discrete sclerotization. Aedeagus short and weakly sclerotized, fusiform; cornuti absent from vesica. Octavals small and rounded.

DIAGNOSIS. A rather nondescript-looking species, but characterized by the acute apex of the fore wing. It resembles males of 62. *Chiasmia simplex*, below, but is smaller. The main differences in the genitalia are found in the shape of the octavals.

BIOLOGY. Adults are active September–February and in May. Usa River, the type locality, was characterized by Fletcher (1978a) as 'at the foot of Mount Meru on its

SSE side at an elevation of 3,900 ft, 15 miles east of Arusha. The district is partially cultivated with areas of coffee and banana plantations, some riverine forest and savannah'.

DISTRIBUTION. Kenya and Tanzania.

ETYMOLOGY. From Latin *acuo*, to sharpen, and *apex* (-*icis*), the top; the name refers to the pointed tip of the fore wing.

### 60. *Chiasmia evansi* sp. n.

Figs 278; 868

TYPE MATERIAL. Holotype ♀, [Kenya]: Marigat, K[enya] C[olony], 4000 ft., 14.8.1950 (R.T. Evans); Loruk, N[orth] L[ake] Baringo, 3500 ft., 14.8.50 (R.T. Evans) [handwritten]; genitalia slide M. Krüger No. 18 (NMKE). See Remarks.

FORE WING LENGTH. 12 mm (♀ holotype).

ADULT ♀ (Fig. 278). Barely medium-sized. Termen of hind wing rounded. Ground colour of wings cream, densely dusted and irrorated with grey. Postmedian area more or less wholly suffused with grey. Basal and median line virtually entirely reduced; postmedian very faint. Two pairs of dark interneurals present on each wing, those on fore wing being larger. Discal spots absent. Underside yellowish with coarse and irregular grey irroration. Postmedian area with a broad grey fascia. Interneurals not visible from beneath. Vestiture of thorax and abdomen ochreous-grey on upper- and yellowish on underside, peppered with grey.

FEMALE GENITALIA (Fig. 868). Papillae anales normal. Apophyses fairly thin, a. anteriores about two-thirds length of a. posteriores. Sterigma: l. postvaginalis forming small sclerotizations near antrum. Antrum well developed, shell-shaped. Bursa copulatrix pear-shaped, with rather wide, strongly ribbed ductus and elliptical, membranous corpus. Signum of medium size.

DIAGNOSIS. Externally, the holotype cannot be separated with certainty from similar specimens of 5. *C. ate* and 4. *zelota*. Examination of the female genitalia demonstrates, however, that these much more closely resemble the genitalia of 61. *C. kilifi*, below (compare Figs 868, 869).

BIOLOGY. The holotype was collected in August at an elevation of 3500 feet.

DISTRIBUTION. Kenya.

ETYMOLOGY. Named in honour of R.T. Evans, who collected the only specimen known.

REMARKS. It is here assumed that Loruk, the locality given on Evans' handwritten label, is the correct type locality.

## 61. *Chiasmia kilifi* sp. n.

Figs 279; 869

TYPE MATERIAL. Holotype ♀, Kenya: Kilifi, June 1949 [handwritten]; genitalia slide M. Krüger No. 43 (NMKE).

FORE WING LENGTH. 11 mm (♀ holotype).

ADULT ♀ (Fig. 279). Small. Ground colour of wings whitish, striated with greyish-brown. Postmedian area of both wings suffused with greyish-brown, but leaving paler blotches along margin. Basal and median line reduced; postmedian faint, angled at about 90° below costa of fore wing. Interneurals present but faint. Discal spots well developed. Underside similar, but contrast between pale and dark areas more striking. Thorax and abdomen of same colour as wings.

FEMALE GENITALIA (Fig. 869). Papillae anales normal, somewhat elongated. Apophyses anteriores markedly stouter, between half and two-thirds length of a. posteriores. Sterigma: l. postvaginalis forming small, pointed sclerotizations on sides of antrum. The latter shell-shaped, prominent but rather narrow. Ductus bursae well sclerotized, its wall ribbed, abruptly widening into the round, membranous corpus. Signum medium-sized, with numerous short spicula.

DIAGNOSIS. A small and very inconspicuous species. The angled fore wing postmedian and the pale areas in the dark postmedian area of the upperside aid in identification. The female genitalia recall those of *C. evansi*, above, but the antrum is markedly narrower and the sterigma more clearly defined (compare Figs 868 and 869).

BIOLOGY. Not known. The holotype was collected in June.

DISTRIBUTION. South-east Kenya.

ETYMOLOGY. Named after the type locality.

## 62. *Chiasmia simplex* sp. n.

Figs 280, 281; 644, 870

TYPE MATERIAL. Holotype ♂, Tanzania: Tansania sept[entrionalis], Oldeani, 9.XII.1961, leg[it] J. Kielland, Staats[amm]l[un]g München; genitalia slide No. 6735 (ZSBS). Paratypes (6♂, 1♀). Tanzania: 1♂, same data as holotype; 1♂, Tanganyika sept[entrionalis], Mt. Meru, Momella, 1600–1800 m, 1.–10.II.[19]64, leg[it] W. Forster, Staats[amm]l[un]g München (ZSBS). Kenya: 1♂, Kibwezi, B[ritish] E[ast] A[frica], April, 1922 (W. Feather) (dissected, Geometridae genitalia slide No. 19204) (BMNH); 1♀, *ibidem*, dated December, 1928 (dissected, Geometridae

genitalia slide No. 19989) (BMNH); 1♂, Nanyuki, May 1951 (Col. Maxwell); 1♂, K[enya] C[olony], Turkana, Wapu Hills, May 1953 (J.C. Williams); genitalia slide M. Krüger No. 28 (NMKE); 1♂, Mtito N'dei, W. of Tsavo, XII.1950, Nat[ional] Mus[eum] Bulawayo; *conturbata* [misidentification]; genitalia slide No. L 676 (NMBZ), (BMNH, NMKE, NMBZ).

FORE WING LENGTH. 13–16 mm (♂), 13 mm (♀).

ADULT (Figs 280, 281). Medium-sized. Ground colour of wings cream-white, densely striated with pale grey and with additional light brown suffusion, particularly in postmedian area. Basal line faint, practically absent on hind wing; median present and more like a fascia in two specimens, absent in the third; postmedian fine and rather inconspicuous, angled at about 90° below costa. Discal spots small. Preapical spot inconspicuous, light brown. Underside whitish with dense grey striation and orange-brown suffusion in postmedian area and along costa of fore wing. Markings as on upperside. Thorax and abdomen ochreous with grey dusting, paler on ventral side. Hind tibia of ♂ hardly dilated. Setal comb on A3 present.

MALE GENITALIA (Fig. 644). Uncus horns well developed; gnathos slender. Costa of valve slightly recurved and somewhat widening towards apex; no ventral process present. Sacculus squarish, apex bearing a small, discrete sclerotization. Aedeagus spindle-shaped, tapering anteriorly; vesica bearing a single, needle-like cornutus near tip. Octavals shallow, with short, rounded tips.

FEMALE GENITALIA (Fig. 870). Papillae anales small, rounded. Apophyses moderately stout but short, a. anteriores about two-thirds length of a. posteriores. Sterigma poorly developed, crescentic. Both the shell-shaped antrum and lateral sclerotizations slender. Bursa copulatrix large, roughly pear-shaped with gradual transition between ductus and corpus bursae. Signum of medium size, elliptical, with numerous small, fine spicula.

DIAGNOSIS. A rather nondescript-looking species, similar to 65. *C. duplicitinea*, below. The differences in the male genitalia are evident from the illustrations (compare Figs 644, 647); those of the female resemble several other members of the group, such as *C. plutocrypsis* and *C. kilifi*, although in these cases there are clear differences in adult habitus. Distributional data are also important, since this new species has so far only been recorded from Tanzania and Kenya.

BIOLOGY. Apparently a savanna species. Adults have been collected in February–March, May and December.

DISTRIBUTION. East Africa, with records from Kenya and Tanzania.

FURTHER MATERIAL. **Tanzania:** 1♂, Tanganyika, Oldeani, 1 Nairobi (NMKE).

ETYMOLOGY. From Latin *simplex* (-*icis*), plain; the moth is of inconspicuous facies.

### 63. *Chiasmia cararia* (Swinhoe, 1904) comb. n.

Figs 282; 645

*Semiothisa cararia* Swinhoe, 1904: 507. Holotype ♂, [Kenya]: B[ritish] E[ast] Africa, Muani, 9.I.[18]99 (C.S. Button), 1900–10.; Geometridae genitalia slide No. 3607; *Semiothisa cararia* Swinhoe ♂ type (BMNH) [examined].

FORE WING LENGTH. 14 mm (♂ holotype).

ADULT ♂ (Fig. 282). Of medium size. Termen of hind wing angled, but not sufficiently attenuated to form a tail. Ground colour of wings pale ochreous, with intense olive-grey striation; postmedian area more or less strongly suffused with olivaceous grey. All three lines well developed; basal and median undulating, postmedian angled at about 80° below costa. Discal spots present but not conspicuous. Some dark maculation present in postmedian area of both wings. Pattern of underside markings as in *C. amarata* and related species. Vestiture of thorax and abdomen olive grey. Hind tibia of ♂ not dilated. Setal comb on A3 present.

MALE GENITALIA (Fig. 645). Uncus horns rather small; gnathos delicate. Costa of valve practically straight, not dilated apically and lacking ventral process. Sacculus about twice width of costa, somewhat angular. Aedeagus of medium size, slightly fusiform; vesica exhibiting a single, needle-like apical cornutus and a small striate area (at apex), as well as a similarly sized patch of microcornuti (towards centre). Octavals broadly w-shaped.

DIAGNOSIS. This species is characterized by its olivaceous coloration and prominent development of all three lines across both wings. As it is at present only known from the holotype, it cannot be determined whether distributional data can aid in identification. The male genitalia indicate a very close relationship of this species to *C. simplex* and *C. acutiapex*, above.

BIOLOGY. Not known. The holotype was collected in January.

DISTRIBUTION. Kenya.

MATERIAL. Known from the ♂ holotype only.

### 64. *Chiasmia deceptrix* sp. n.

Figs 283–285; 646, 871; 1005

TYPE MATERIAL. Holotype ♂, [Zimbabwe]: (S. Rhodesia), Harare (Salisbury), 24.3.[19]68 (A.J. Duke); ex collection A.J. Duke, donated August 1979; TM Lep[idoptera] Het[erocera] Genitalia slide No. 11129 (TM). Paratypes (23♂, 19♀). [Zimbabwe]: 8♂, 8♀, Dichwe Forest, dated 29.XII.1978 (8) and 6.V.1979 (8) (N.J. Duke) (TM genitalia slides No. 10838, 11136); 1♂, Lowdale, 15.III.1969 (A.J. Duke); 1♀, Masoka, Chiware Safari area, 14.XI.1978 (A.J. Duke); 1♀, locality not specified, 4.III.1951 (Dr S.H. Skaife); 1♂, Mutare (Umtali), Meikle's Jungle, 20.I.1948 (TM genitalia slide No. 11079). **South Africa, Transvaal:** [Northern Province]: 1♀, Marieps Mountain, 7.XII.1925 (G. van Son); 1♀, Punda Milia, 6.–15.V.1975 (Potgieter & Scoble); 1♂, T[rans]v[aal], Blouberg, N. side, Glenfernness, 16.–21.I.1955, Transv[aal] Mus[eum] Exp[edition]; TM Lep[idoptera] Het[erocera] Genitalia slide No. 10833; 3♂, 1♀ *ibidem* (TM genitalia slide No. 10834). 2♂, 1♀, Soutpansberg, Wylie's [sic] Poort, dated 11.XI.1920 (♀), 24.–26.I.1988 (2♂). [Mpumalanga]: 2♂, 3♀, Skukuza, 22.–23.I.1992 (M.J. Scoble); 1♀, Skukuza, 3.IV.1952 (L. Vári). **Moçambique:** 2♂, Forest 6 m W. of camp, Massangena District, Save River, 10.XII.1972, F. de Moor- F.C. Expedition, NMBZ genitalia slide L 667; 1♂, Chiluvo Hills, Vila Machado, 30.X.1967 (E. Pinhey) (NMBZ). **[Tanzania]:** 1♂, Tanganyika, Lindi, Ndanda, 300 m, 1.XII.1958, leg. Ch. Lindeemann, Staatss[amm]l[un]g München (ZSBS genitalia slide G 7501); 1♀, *ibidem*, dated 4.VIII.1952, leg. Lindemann & Pavlitzki, Zoolog[ische] Staatss[amm]l[un]g; *Semiothisa duplicitinea* Warr. det. D.S. Fletcher 1957 [misidentification] (Geometridae genitalia slide No. 24 (ZSBS); 1♂, Usa River, 3900 ft, IX–II. 1965–66, leg[it] Dr J. Szunyoghy; Geometridae genitalia slide No. 10073 (BMNH) (BMNH, ZSBS, NMBZ, TM, N.J. Duke collection).

[*Semiothisa duplicitinea* (Warren); Fletcher, 1958a: 137. Misidentification.]

FORE WING LENGTH. 15–16 mm (♂), 15–17 mm (♀).

ADULT (Figs 283–285). Ground colour of wings whitish, thickly irrorated with ochreous to pure grey. Tail of hind wing moderately well developed in ♂, poorly developed in ♀, which is also larger and has clearer markings. Basal and median lines weakly developed on both wings, postmedian line inconspicuous to well developed. Discal spots faint. Black maculae on wings as in other species, but generally faint or absent in ♂. Underside: basal and median areas whitish with orange to medium brown striations, discal spots present, median line more like a fascia. Postmedian area wholly orange brown with darker striae of varying density; whitish blotches present along termen. Vestiture of thorax and abdomen ochreous to light grey. Hind tibia of ♂ dilated. Setal comb on A3 present.

MALE GENITALIA (Fig. 646). Uncus horns large; gnathos rather small. Valve elongated, costa slightly widening towards apex, bearing a single, large ventral process. Sacculus large, extended to form a broadly triangular, drooping process. Aedeagus elongated and somewhat attenuated; vesica lacking cornuti but exhibiting some striations near apex. Octavals shallow, with broadly rounded, heavily sclerotized tips.

FEMALE GENITALIA (Fig. 871). Papillae anales normal. Both pairs of apophyses slender; a. anteriores two-thirds length of a. posteriores. Sterigma: l. antevaginalis not modified, l. postvaginalis taking the shape of two large separate sclerotizations on sides of the stout antrum. Ductus bursae long and broad, ribbed posteriorly; corpus bursae rounded. Signum very large, elliptical.

DIAGNOSIS. Similar to 58. *C. amarata* and 65. *C. duplicitinea*, but more brownish. Specimens of *C. duplicitinea* are usually smaller. The differences in genitalia structure are evident from the illustrations (compare Figs 642, 646, 647 and 867, 871, 872). Both *C. amarata* and *duplicitinea* are more or less coastal in distribution, whereas *deceprix* occurs further inland.

BIOLOGY. *Chiasmia deceptrix* inhabits frost-free savanna, with most records coming from the Transvaal highveld and Zimbabwe. Adults have been collected in January, March to May and from October to December.

DISTRIBUTION (Fig. 1005). From the northern and eastern Transvaal through Moçambique, Zimbabwe and Zambia to Tanzania.

FURTHER MATERIAL. 4♂ (1 dissected, genitalia slide No. L 680) (NMBZ) and 7♀. 11 Bulawayo (NMBZ).

LOCALITIES. **Zimbabwe:** Umtali District (2), Vumba (1), Busi Farm, Chipinga (1), Chipinda Pools, Gonarezhou Reserve (1), 96 m SE Nuanetsi (1), Pesu Gorge, Sengwe TTL (1), Chimanimani Mts (1), Doddieburn Ranch (1). **Zambia:** Katambora (1). **Moçambique:** Massangena District, Save River (1).

ETYMOLOGY. From Latin *deceptor* (f. *deceprix*), a deceiver; on account of its close similarity to *C. amarata*.

## 65. *Chiasmia duplicitinea* (Warren, 1897) comb. n.

Figs 286–288; 647, 872; 1006

*Gonodela* [sic] *duplicitinea* Warren, 1897a: 107.  
LECTOTYPE ♀, here designated, [**South Africa, KwaZulu-Natal:**] Weenen, Natal, XII [18]93; Rothschild Bequest B.M. 1939–1.; Geometridae genitalia slide No. 3603; IV.107/*Gonodela* [sic]

*duplicilinea* Warr. ♀ type (BMNH) [examined]. Paralectotypes (2♀). [**South Africa:**] *ibidem*, dated November and undated, respectively (BMNH) [examined].

*Macaria duplicitinea* (Warren); Janse, 1917: 113.  
*Semiothisa duplicitinea* (Warren); Janse, 1932: 211; Fletcher, 1958a: 137 [misidentification]; 1978a: 80.

FORE WING LENGTH. 13–15 mm (♂), 12–15 mm (♀).

ADULT (Figs 286–288). Ground colour of wings whitish, dusted with ochreous-grey. Postmedian area darker grey. All lines present, but basal and median inconspicuous and ill defined; the double postmedian line clearer in most, but not all, specimens. A blackish spot, divided by postmedian line, present on fore wing; another situated near anal angle of hind wing in some specimens. Discal spots faint to well developed. Underside whitish, striated with grey and orange to medium brown. Discal spots and median line well developed to absent. Postmedian area more or less wholly orange to medium brown, with some whitish blotches along termen of wings. Vestiture of thorax and abdomen ochreous to grey. Hind tibia of ♂ hardly dilated. Seta comb on A3 absent.

MALE GENITALIA (Fig. 647). Uncus horns and gnathos medium-sized. Valves comparatively short, costa with a single blunt process, appearing narrow compared with the large sacculus. Aedeagus short and stout, fusiform; vesica lacking cornuti but exhibiting striations in apical half. Octavals somewhat w-shaped.

FEMALE GENITALIA (Fig. 872). Papillae anales narrow. Both pairs of apophyses slender, a. anteriores about two-thirds length of a. posteriores. Antrum shell-shaped, elongated, with sterigma (l. postvaginalis) forming two small sclerotizations on sides. Bursa copulatrix pear-shaped with short ductus. Signum moderately large.

DIAGNOSIS. Similar to *C. amarata* and *deceprix* but smaller and sympatric only with *amarata*. In the male genitalia, *C. duplicitinea* is easily recognized by the large and rounded sacculus, the apex of which is not drooping, and the shape of the octavals. In the female, the sterigma with its very small sclerotizations and the not very strongly elongated bursa copulatrix are typical.

BIOLOGY. Distributional data suggest that *C. duplicitinea* prefers localities further inland than does the primarily coastal *C. amarata*. Adults have been collected in February–March, May and in November–December.

DISTRIBUTION (Fig. 1006). Restricted to southern Africa and recorded from KwaZulu-Natal, including the former territory of Transkei. In contrast to *C. amarata*, most records of this species are from inland areas.

MATERIAL. 19♂ (5 dissected, TM genitalia slides No. 11127, 11138, 11141, 11142; genitalia slide L 664 (NMBZ)) and 17♀ (3 dissected, TM genitalia slides No. 11128, 11132, 11139). 1 Berlin (ZMHB), 20 Pretoria (TM), 1 Cape Town (SAM), 2 Nairobi (NMKE), 1 Bulawayo (NMBZ), 8 N.J. Duke collection, 3 H.S. Staude collection.

LOCALITIES. **South Africa, KwaZulu-Natal:** Jozini Dam, Lebombo Mts (17), Mboma (1), Muden (7), Hlabeni mist forest, 1500 m, Creighton District (3), M'fongosi (1), Weenen (1), Karkloof (1). **Cape Province:** [Eastern Cape]; 20 m E. Umtata (1), The Haven (1), Panza (4).

REMARKS. Of the four syntypes on which Warren based his description, only three could be located in BMNH. These are designated above as lecto- and paralectotypes, respectively.

#### 66. *Chiasmia megalesia* (Viette, 1975) comb. n.

Figs 289, 290; 648, 873

*Semiothisa megalesia* Viette, 1975: 16. Holotype ♂, **Madagascar:** Holotype; Madagascar Sud, plateau Mahafaly, 11/12 km Ouest d'Ankalirano, 250 m, 18°–31.i.1974 (P. Viette); *Semiothisa megalesia* n.sp. ♂ Holotype, P.E.L. Viette det. 1975; genitalia slide M. Krüger No. 1 (MNHN) [examined]. Paratype (1♀). **Madagascar:** same data as holotype (MNHN) [not examined].

FORE WING LENGTH. 12 mm (♂ holotype).

ADULT (Figs 289, 290). Small. Termen of both wings finely crenulated. Ground colour cream white, densely suffused with grey. All three lines present, wavy, but weak except for postmedian which is particularly prominent on hind wing. Discal spots faint. A number of darker maculae close to postmedian on hind wing. Underside chalk white, densely irrorated with greyish-brown; discal spots and lines well developed. Postmedian area almost wholly greyish-brown with only some white maculation discernible. Vestiture of thorax and abdomen concolorous with wings, grey. Hind tibia of ♂ not modified. Setal comb on A3 absent.

MALE GENITALIA (Fig. 648). Uncus horns and gnathos medium-sized. Costa of valve virtually straight, not dilated apically; ventral process small and inconspicuous, arising near connection with sacculus. The latter squarish, its contour with a prominent 'bulge'. Aedeagus short and fusiform; vesica exhibiting some microcornuti and striations near apex. Octavals small and shallow, w-shaped.

FEMALE GENITALIA (Fig. 873) (from an abdomen received from J. Minet, MNHN). Papillae anales

relatively broad. Apophyses slender. Sterigma not particularly modified. Antrum slender, lacking lateral sclerotizations. Bursa copulatrix between tubular and pyriform in shape, ductus bursae slightly shorter than corpus, ribbed. Signumstellate.

DIAGNOSIS. *Chiasmia megalesia* is the smallest member of its group and easily recognized on account of its size alone. The wavy dark postmedian line on the hind wing is also typical.

BIOLOGY. Most specimens have been taken in forests in the southern and western parts of the island at altitudes between 200 and 500 m. Adults are active in October and December–April.

DISTRIBUTION. Madagascar.

MATERIAL. 18♂ (1 dissected, Geometridae genitalia slide No. 16931) (BMNH). 4 London (BMNH), 14 Paris (MNHN).

LOCALITIES. **Madagascar:** Diego Suarez (4), S., plateau Mahafaly, 11/12 km Ouest d'Ankalirano, 250 m (5), W., Nat. Road 7, 64 km E. of Tulear, Andranovary Forest, 500 m (4), W., Nat. Road 7 at km 892, Andaromihomaka Forest, 390 m (3), Andobo, Autsingy Forest, 190 m (1), W., new Ambondromamy-Port Bergé Vaovao road at km 122, Sarodrano Forest, 200 m (1).

#### 67. *Chiasmia unigeminata* (Prout, 1923) comb. n.

Figs 291–293; 649, 874

*Macaria unigeminata* Prout, 1923: 315. Holotype ♂, **Cameroon:** ♂; Bitje, Kamerun, IX; comm. A. Heyne; Holotypus; *Macaria unigeminata* Prout ♂ type (DEI) [examined].

FORE WING LENGTH. 13–14 mm (♂), 11–13 mm (♀).

ADULT (Figs 291–293). Small to medium-sized. Ground colour of wings whitish, thickly irrorated with pure grey, especially densely so in postmedian area. ♀ smaller than ♂, hind wings without 'tail'. All lines as well as discal spots usually faint, though postmedian occasionally well developed. Preapical spot prominent, brown. Underside white, with heavy, coarse, dark brown speckling. Postmedian area dark brown with whitish blotches. Vestiture of body grey. Hind tibia of ♂ not modified. Setal comb on A3 absent.

MALE GENITALIA (Fig. 649). Uncus horns and gnathos well developed. Costa of valve slightly recurved and widening apically, exhibiting a long and narrow ventral process. Sacculus large and pointed, with a small sclerotization covering tip. Aedeagus rather massive; vesica with a large subapical area of denser sclerotization that apparently does not constitute a cornutus. Octavals arcuate and shallow, with broadly rounded tips.

FEMALE GENITALIA (Fig. 874). Papillae anales medium-sized, well rounded. Both pairs of apophyses relatively short, a. anteriores about two-thirds length of a. posteriores. Sterigma (l. postvaginalis) forming two small, heart-shaped sclerotizations. Antrum prominent, elongated. Bursa copulatrix taking the shape of a long tube. Ductus and corpus bursae of equal width; ductus ribbed posteriorly. Signum elliptical, with very short spicula.

DIAGNOSIS. Confusion is possible with 71. *C. trigonoleuca* and 72. *C. plutocryspsis*, below. Compared with *trigonoleuca*, the wings of *unigeminata* are less elongated and appear broader, while the species can be separated from *plutocryspsis* by the absence of the conspicuous dark marks on the hind wing. The genitalia of *unigeminata* are close to 68. *C. costiguttata*, below, although the moths are rather dissimilar (compare Figs 649, 650 and 874, 875).

BIOLOGY. The species is probably associated with tropical forests. Adults have been collected in April–May and August–October.

DISTRIBUTION. From western and central Africa (Cameroon, Zaire, Spanish Guinea) eastwards to Uganda, but only known from few, widely separated localities.

MATERIAL. 6♂ (1 dissected, Geometridae genitalia slide No. 16119) (BMNH) and 3♀ (1 dissected, Geometridae genitalia slide No. 16120) (BMNH), 2 London (BMNH), 4 Berlin (ZMHB), 3 Nairobi (NMKE).

LOCALITIES. **Cameroon:** S. Cameroons, Epulan (1), Johann-Albrechtshöhe (2). Lolodorf (1). **[Zaire]:** (Congo Free State), Upper Kasai District (1). **[Guinea]:** (Spanish Guinea), Benitogebiet (1). **Uganda:** Mabira Forest, Jinja (1); W., Bwamba (1). **Not traced:** Thomson Falls (1).

#### 68. *Chiasmia costiguttata* (Warren, 1899) comb. n.

Figs 294–296; 650, 875

*Azata costiguttata* Warren, 1899a: 58. Holotype ♀, **[Tanzania]:** Mikindani, i to v [18]97 (Reimer); VI.58/

*Azata costiguttata* Warr. type ♀; Rothschild Bequest B.M.1939–1 (BMNH) [examined].

*Azata triplaga* Warren, 1899a: 59. LECTOTYPE ♀, here designated, **[Tanzania]:** Mikindani, i to v [18]97 (Reimer); VI.59/*Azata triplaga* Warr. type ♀; Rothschild Bequest B.M. 1939–1 (BMNH) [examined]. **Syn. n.** Paralectotype (1 ♀). **[Tanzania]:** same data as holotype (BMNH) [examined].

*Semiothisa deuteria* Prout, 1932a: 487. Holotype ♂, **[Kenya]:** Type; Afr[ique] or[ientale] angl[aise]

(Wa-Taita), Bura (Alluaud & Jeannel) Mars 1912, 1050m, St. 61; *Semiothisa deuteria* Prout ♂ type; *Semiothisa deuteria* Prout, Mé[moires] [de la Soc[iéte] ent[omologique] [de] France 1932, 26 p.000 (P. Viette Mai 1951) (MNHN) [examined]. **Syn. n.** *Semiothisa deuteria* Prout; Fletcher, 1978a: 80.

FORE WING LENGTH. 13–15 mm (♂), 13–14 mm (♀).

ADULT (Figs 294–296). Medium-sized. Ground colour of wings whitish, densely suffused with greyish-brown to ochre (♂) or ochre (♀) and with irregular darker striation. Postmedian area darker in both sexes. Basal and median lines usually weakly developed, frequently incomplete; postmedian ranging from rather faint to prominent and acutely angled below costa of fore wing. Discal spots inconspicuous. Preapical spot not very prominent, brown. Underside ochreous with intense darker dusting; discal spots usually well developed. Postmedian area darker, medium to dark brown with lighter patches along termen. Thorax and abdomen concolorous with wings. Hind tibia of ♂ not modified. Setal comb on A3 absent.

MALE GENITALIA (Fig. 650). Uncus horns small but stout; gnathos well developed, deeply emarginate. Costa of valve straight, not dilated apically; a single, thin, acutely pointed process present. Sacculus somewhat triangular, apical region with a discrete sclerotization. Aedeagus elongated and spindle-shaped; vesica bearing a single median cornutus and exhibiting some subapical striations. Octavals in shape between arcuate and furcate, tips broadly rounded.

FEMALE GENITALIA (Fig. 875). Papillae anales well developed, pointed. Apophyses anteriores about half length of a. posteriores. Sterigma with l. postvaginalis forming two small lateral 'ears'. Antrum shell-shaped, large. Bursa copulatrix resembling a wide tube; ductus slightly ribbed and sclerotized in posteriormost section; corpus membranous throughout. Signum broadly elliptical, with numerous short spicula.

DIAGNOSIS. Similar to 167. *C. getula*, below, but markedly smaller; the differences in genitalia structure are evident from the illustrations (compare Figs 650, 740 and 875, 963). The male genitalia of *C. costiguttata* are quite close in structure to those of *C. unigeminata*, above.

BIOLOGY. The available records suggest a largely afrotropical distribution. Adults have been collected in January and in March–July at elevations from 800–1500 m. The two specimens seen from Rwanda are remarkably small (fore wing length 13 mm in both sexes).

DISTRIBUTION. East Africa, recorded from Ethiopia, Rwanda, Kenya and Tanzania.

MATERIAL. 16♂ (2 dissected, Geometridae genitalia

slide No. 16121) (BMNH); genitalia slide L 678 (NMBZ)) and 10♀(2 dissected, Geometridae genitalia slides No. 16122, 16151) (BMNH). 3 London (BMNH), 1 Berlin (ZMHB), 3 Munich (ZSBS), 15 Nairobi (NMKE), 2 Bulawayo (NMBZ), 2 C. Herbolut collection.

**LOCALITIES.** **Ethiopia:** Abessinien (no further data) (1), Dire Daoua (2), Harrar (3). **[Kenya]:** (British East Africa), Kibwezi (2), Taveta (1), Isiolo (5), Ngong/ Nairobi (1), env. Nairobi (4), Migwani, Kitui (1), Karura Forest/Nairobi (1). **Tanzania:** Mwanea (1), Oldeani (2), Morogoro (1). **Rwanda:** Hôtel de l'Akagera (2).

#### 69. *Chiasmia kenyae* sp. n.

Figs 297–299; 651, 876

**TYPE MATERIAL.** Holotype ♂, **[Kenya]:** K[enya] C[olony], Isiolo, Apr[il]–May 1951 (Mrs. Adamson); genitalia slide M. Krüger No. 36 (NMKE). Paratypes (2♂). **Kenya:** 1♂, Ngong, Nairobi, Apr[il]–May 1954 (Fowler & Coulson); 1♂, Baringo, June 1973 (G. Rilling) (NMKE).

**FORE WING LENGTH.** 13–15 mm (♂), 13 mm (♀).

**ADULT ♂** (Figs 297–299). Medium-sized. Antennae ciliate. Wings rich ochreous, with irregular greyish striations. Postmedian area suffused with brown. All three lines present. Basal line faint; median ill defined, more like a fascia; postmedian line well developed, angled below costa of fore wing. Discal spots not conspicuous; preapical spot brown. Underside vividly ochreous, speckled with brown; postmedian area with broad, medium brown band. Discal spots and median line moderately well to well developed. Vestiture of thorax and abdomen ochreous mixed with grey. ♀(Fig. 299). See also below. Rather small. Fore wing gently emarginate below apex; termen of hind wings crenulated. Ground colour of wings whitish, with dense ochreous suffusion and irregular darker dusting. Postmedian area only slightly darker ochreous. All lines quite faint; postmedian angled at about 90° below costa of fore wing. Preapical spot present, brown. Discal spots small and inconspicuous. Underside similar, postmedian area darker, rather brown. Vestiture of thorax and abdomen dark ochreous. Hind tibia of ♂ not modified. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 651). Uncus horns short; gnathos deeply emarginate. Costa of valve straight, somewhat dilated apically and bearing an acutely pointed ventral process. Sacculus large and squarish, with a small discrete sclerotization near tip. Aedeagus stout; vesica bearing a rod-like, smooth apical cornutus and an ill-defined, apparently spiny median cornutus. Octavals small and shallow, w-shaped, with broadly rounded tips.

**FEMALE GENITALIA** (Fig. 876). Papillae anales small, rounded. Apophyses moderately stout, a. anteriores about two-thirds length of a. posteriores. Sterigma (l. antevaginalis) narrow, crescentic, strongly sclerotized along posterior margin. Antrum medium-sized, rhombic. Bursa copulatrix pear-shaped; ductus slightly ribbed; corpus rounded, with small, circular signum.

**DIAGNOSIS.** Similar to several other species of *Chiasmia*, notably 68. *C. costiguttata*, and dissection of the genitalia is advisable for reliable identification.

**BIOLOGY.** The three type specimens were collected in April–June.

**DISTRIBUTION.** Kenya and Tanzania.

**ETYMOLOGY.** Named after the country from which most known specimens originate.

**FURTHER MATERIAL.** 1♀ (dissected, genitalia slide M. Krüger No. 6) (NMKE). 1 Nairobi (NMKE).

**LOCALITIES.** **[Tanzania]:** Tanganyika, Amani (1).

This ♀ probably belongs to *C. kenyae*. However, since the association cannot be made with certainty it is not included in the type series.

#### 70. *Chiasmia orientalis* sp. n.

Figs 300–302; 652, 877; 1006

**TYPE MATERIAL.** Holotype ♂, **[Moçambique]:** (P[ortuguese] E[ast] A[frica]), Dondo, 12.IX.1954 (H. Cookson); TM Lep[idoptera] Het[erocera] Genitalia slide No. 11080 (TM). Paratypes (24♂, 13♀).

**Moçambique:** 1♂, Serra Rotanda, E. of Chimanimani Mts., 3.III.1970 (E. Pinhey); 1♂, Mussapa River Forest, Serra Rotanda, 17.III.[19]73 (Pinhey-de Moor Exp[edition]; 2♂, 4♀, P[ortuguese] E[ast] A[frica], E. of Mt. Chiperone, 2.-3.IV.[19]13 (S.A. Neave); 1♂, Dondo Forest, Dondo, 13.XI.[19]67 (E. Pinhey); 2♂, *ibidem*, dated 27.X.[19]63. **Malawi:** 1♀, Chikale Beach, Nkata Bay, 25.XI.[19]70; 1♂, 2♀, Mkuwadzi Forest, Nkata Bay, 6.V.[19]66, genitalia slides L 646 (♂), L 647 (♀); 1♂, *ibidem*, dated V.[19]66; 2♂, *ibidem*, dated 5.V.[19]66; 1♂, *ibidem*, dated 12.V.[19]66; 4♂, 3♀, Nyasaland, Mt. Mlanje (S.A. Neave), dated 14.II.–6.V.[19]13; 1♂, Mlanje, Luchenya River, 31.XI.[19]12 (S.A. Neave); 1♂, 2♀, Nyassa, Magunda Estate, Luchenya (F. Nisket). **[Zambia]:** 1♂, (N[orthern] Rhodesia), Ikelenge, Mwinilunga, 27.IV.1963; 1♂, N[orthern] Rhodesia, Mwinilunga, V.[19]61; 1♂, Sakeji School, Mwinilunga, 6.VI.[19]84.

**[Zimbabwe]:** 1♂, S[southern] Rhodesia, Vumba, 7.XII.[19]69 (A.J. Duke). **[Tanzania]:** 1♂, Tanganyika, Amani, Usambara, Feb[ruary] 1962 (G. Pringle); 1♀, Amani, 1000 m, 17.–18.IV.1976 (B. Turlin). **Uganda:** 1♂, Entebbe, VI.[19]61 (BMNH, NMKE, TM, C. Herbolut collection).

FORE WING LENGTH. 15–17 mm (♂), 17 mm (♀).

ADULT (Figs 300–302). Rather large. Fore wings narrow in both sexes, 'tail' on hind wing moderately pronounced. Ground colour of wings whitish, dusting coarse, ranging from pale ochreous to dark grey. Basal line faint on fore wing, absent on hind wing; median line ill defined, more like a fascia; postmedian line also not well developed, in some specimens with faint dark maculation on fore wing. Preapical spot brown. Postmedian area usually slightly more heavily marked. Discal spots faint on fore wing, more prominent on hind wing. Underside whitish with irregular orange-and-brown striation, median line and discal spots usually prominent. Postmedian area orange-and-brown with whitish blotches along termen. Intensity of colour varying considerably. Vestiture of thorax and abdomen ochreous to dark grey. Hind tibia of ♂ dilated. Setal comb on A3 present.

MALE GENITALIA (Fig. 652). Uncus horns long; gnathos slender. Costa of valve straight, forming somewhat angular spatula; sacculus well developed and exhibiting sinuous sclerotized band. Termen of sacculus extended to form short, drooping process. Aedeagus tapering anteriorly; vesica bearing a slender, club-shaped median cornutus and exhibiting a large subapical patch of microcornuti. Octavals arcuate, deeply emarginate.

FEMALE GENITALIA (Fig. 877). Papillae anales short and rounded. Apophyses slender, a. anteriores rather more than two-thirds length of a. posteriores. Sterigma highly characteristic, l. postvaginalis extended to form into two horn-like processes (cf. 34. *C. infabricata*, Fig. 848). Antrum prominent. Corpus bursae elongated, with short, weakly ribbed ductus; signum medium-sized.

DIAGNOSIS. Together with 71. *C. trigonoleuca*, below, from which it can reliably be separated only by means of examination of the genitalia, this species is relatively easily recognized by the narrow fore wings and rather coarse dusting on the wings. The differences in genitalia structure are evident from the illustrations (compare figures 652, 653 and 877, 878).

BIOLOGY. *Chiasmia orientalis* appears to be an uncommon forest species, restricted to the northern parts of southern Africa and East Africa. Adults have been collected from March–May and in November–December.

DISTRIBUTION (Fig. 1006). From southern Moçambique and Zimbabwe through Zambia and Malawi to Tanzania and Uganda.

ETYMOLOGY. From Latin *orientalis* (-e), pertaining to the east; from the more easterly distribution in comparison with the similar *C. trigonoleuca*, below.

### 71. *Chiasmia trigonoleuca* (Herbulot, 1987)

comb. n.

Figs 303; 653, 878

*Semiothisa trigonoleuca* Herbulot, 1987: 282. Holotype ♂, Cameroon: 6 km NE d'Edéa, 28. et 29.III.1970 (C. Herbulot); Pr[éparation] No. 6409 C. Herbulot; *Semiothisa trigonoleuca* Hrblt. Holotype (C. Herbulot collection) [examined]. Paratypes (6♂, 10♀). As listed in Herbulot (*loc. cit.*, pp. 283–284) [not examined].

FORE WING LENGTH. 13–15 mm (♂), 14–15 mm (♀).

ADULT (Fig. 303). Examined examples slightly smaller than *C. orientalis*; dusting in ♂ dark grey, in ♀ lighter grey. Otherwise as described for *C. orientalis*, above. Vestiture of thorax and abdomen concolorous with wings, somewhat paler on underside. Hind tibia of ♂ dilated. Setal comb on A3 present.

MALE GENITALIA (Fig. 653). Uncus horns very long; gnathos normal, though rather slender. Valve massive. Costa elongated, forming a slender spatula. Sacculus rounded, exhibiting sclerotized area on apex. Aedeagus short, straight, more heavily sclerotized in anterior half; vesica with two thin needle-like cornuti and a subapical patch of microcornuti. Octavals furcate, with long tips.

FEMALE GENITALIA (Fig. 878). Papillae anales normal. Both pairs of apophyses moderately strong and rather short, a. anteriores barely reaching half length of a. posteriores. Sterigma: l. postvaginalis greatly developed. Antrum large, rather funnel-shaped. Ductus bursae widest at junction with antrum, then gradually tapering, its wall ribbed. Corpus bursae elongated, pear-shaped, signum of medium size.

EARLY STAGES. Although the species has been reared in captivity (Vuattoux, 1980), no description of the early stages is available.

DIAGNOSIS. Externally very similar to *C. orientalis*, above, but apparently smaller and darker; in addition, the two species appear to be sympatric in Uganda only. For the differences in the genitalia, compare figures 652, 653 and 877, 878.

BIOLOGY. The species is probably associated with tropical forest. The larva has been reared on *Erythrophleum guineense* G.Don., a cesalpinoideous tree, in Ivory Coast (Vuattoux, 1980).

DISTRIBUTION. Disjunct, recorded from West (Cameroon, Congo, Gabon and Ivory Coast) and East Africa (Uganda, Kenya).

MATERIAL. 8♂ (1 dissected, genitalia slide No. 18) (ZMHB) and 7♀ (1 dissected, genitalia slide No. 10) (ZMHB). 3 London (BMNH), 6 Berlin (ZMHB), 1 Munich (ZSBS), 5 Nairobi (NMKE).

**LOCALITIES.** **Ivory Coast:** Bingerville (1). **Cameroon:** Bitje(1); Ja River(1); Lolodorf(1); Namiong near Lolodorf, Lokundje River(5); W., Victoria, 0–80 m (1), no further data (1). **Uganda:** Entebbe (2); 20 m W. Kampala (1). **Kenya:** Coast, Shimba Hills (1).

### 72. *Chiasmia plutocrypsis* (Herbulot, 1987) comb. n.

Figs 304; 654, 879

*Semiothisa plutocrypsis* Herbulot, 1987: 276. Holotype ♀. **Cameroon:** Elang, 40 km SSE [de] Yaoundé, 20.–23.III.1974 (A. Ntomb); *Semiothisa plutocrypsis* Hrblt. Holotype (C. Herbulot collection) [examined]. Paratypes (1♂, 1♀). 1♂, **Ivory Coast:** Lamto, Bandama shores, 5.VII.1970 (R. Vuattoux). 1♀, **Cameroon:** 6 km NE Edéa, 28.–29.III.1970 (C. Herbulot) (C. Herbulot collection) [examined].

FORE WING LENGTH. 13–14 mm (♂), 14 mm (♀).

**ADULT** (Fig. 304). Of medium size, hind wing without 'tail'. Ground colour of wings white to cream white, irregularly irrorated with pure grey in basal and median area, and nearly wholly grey in postmedian area of wings. Basal and median line apparently always very faint, postmedian sometimes slightly better developed. Discal spots faint or absent. In clearly marked examples very conspicuous black spots present in postmedian area of both wings; these may, however, be small. Underside white, basal and median area thickly speckled with orange brown, markings not clearly defined. Postmedian area wholly orange brown with white blotches along termen of both wings. Thorax and abdomen grey. Hind tibia of ♂ dilated. Setal comb on A3 probably absent.

**MALE GENITALIA** (Fig. 654). Uncus horns well developed, slender; gnathos rather delicate. Costa of valve straight, not dilated apically and bearing a single, very short process. Sacculus large and triangular. Aedeagus stout and somewhat fusiform; vesica with a single, needle-like cornutus near apex, an apical patch of microcornuti and a granulose median area. Octavals triangular, very shallow.

**FEMALE GENITALIA** (Fig. 879). Papillae anales prominent. Apophyses normally developed, rather short. Sterigma: l. antevaginalis not developed; l. postvaginalis forming two small 'ears' on sides of antrum. Antrum of medium size, shell-shaped. Bursa copulatrix elongated and pear-shaped. Ductus bursae broad and ribbed; corpus membranous. Signum well developed, elliptical.

**DIAGNOSIS.** Characterized by its light, pure grey colour in combination with the mostly large black marks on both wings.

**BIOLOGY.** *Chiasmia plutocrypsis* is associated with tropical forests in West and, more rarely, East Africa. Adults have been observed in March, May and July.

**DISTRIBUTION.** Predominantly West Africa (Liberia, Ivory Coast and Cameroon), but also recorded from Uganda.

**MATERIAL.** 7♂ (1 dissected, genitalia preparation M. Krüger No. 13) (ZMHB) and 4♀ (1 dissected, genitalia preparation No. 14) (ZMHB). 1 London (BMNH), 2 Berlin (ZMHB), 8 Nairobi.

**LOCALITIES.** **Cameroon:** Johann-Albrechts-Höhe (1), Bibundi (1); Bafia (1). **Uganda:** Bwamba, Toro (4); Mabira Forest, Jinja (1). **Liberia:** Grassfield, Nimba (3).

### 73. *Chiasmia angolae* (Bethune-Baker, 1913) comb. n.

Figs 305, 306; 655

*Macaria angolae* Bethune-Baker, 1913: 572. Holotype ♂. **Angola:** Type; N'Dalla Tando, N[orth] Angola, 2700 feet, 9.XII.1908 (Dr W.S. Ansorge); *Macaria angolae* B.-B. Type; G.T. B.-Baker Coll. Brit. Mus. 1927–360 (BMNH) [examined].

FORE WING LENGTH. 11 mm (♂).

**ADULT** ♂ (Figs 305, 306). Small. Ground colour of wings cream white, heavily suffused with dark greyish-brown; some specimens lighter. Some pale orange scales present near apex of fore wing. Lines absent or virtually so; postmedian mostly discernible, undulating. Discal spots absent. A large blackish spot present in postmedian area of fore wing, about level with cell. Underside white with fine brown striations; basal areas of both wings and costal and apical part of fore wing suffused with orange; postmedian area predominantly brown with some white areas along termen. Thorax and abdomen concolorous with wings, grey to greyish-brown on upper- and more ochreous on underside. Hind tibia of ♂ dilated. Setal comb on A3 present.

**MALE GENITALIA** (Fig. 655). Small. Uncus horns and gnathos medium-sized. Costa of valve slightly recurved, not dilated apically, and lacking ventral process. Sacculus large, rounded. Aedeagus short, fusiform; vesica bearing a long, rod-like cornutus in apical half and exhibiting an area of somewhat denser sclerotization near centre. Octavals inconspicuous and very shallow, weakly sclerotized.

**DIAGNOSIS.** An unmistakable species. *Chiasmia subcretata*, below, is similar but slightly larger and darker, and entirely lacks the orange suffusion on the underside of the hind wings. The close relatedness of the two species is also reflected in genitalic structure (compare figures 655, 656).

**BIOLOGY.** *Chiasmia angolae* is presumably an inhabitant of tropical forests. Adults have been collected in April and December.

**DISTRIBUTION.** West Africa, with records from Cameroon and Ghana, reaching Angola in the South.

**MATERIAL.** 5♂ (2 dissected, Geometridae genitalia slides No. 16113, 16114) (BMNH). 5 London (BMNH).

**LOCALITIES.** **Angola:** Quicolongo, 120 km N. Lucala (1), Canhoca (1), N., N'Dalla Tondo, 2700 ft (1). **Cameroon:** Johann-Albrechts-Höhe Station (1). **Ghana:** Kumasi (1).

#### 74. *Chiasmia subcretata* (Warren, 1905) comb. n.

Figs 307, 308; 656, 880

*Gonodela* [sic] *subcretata* Warren, 1905a: 37. Holotype ♀, **Uganda:** Entebbe, July 1900 (Capt. H.B. Rattray); XII p.37/*Gonodela* [sic] *subcretata* Warr. Type ♀, Rothschild Bequest B.M. 1939-1 (BMNH) [examined].

**FORE WING LENGTH.** 12 mm (♂), 13 mm (♀).

**ADULT** (Figs 307, 308). Ground colour of wings white, but entirely suffused with a uniform, very dark brown. All three lines present, blackish brown, undulating. Discal spots absent. Underside with extent of dark suffusion very variable; fore wings except for basal area usually entirely suffused, hind wing ranging from predominantly brown to predominantly white; in the latter case median and postmedian lines well developed. Thorax and abdomen dark brown on upperside, ochreous below. Hind tibia of ♂ dilated. Setal comb on A3 present.

**MALE GENITALIA** (Fig. 656). Uncus horns and gnathos well developed. Costa of valve straight, somewhat truncated apically, without ventral process. Sacculus large, angular. Aedeagus short and fusiform; vesica bearing a weakly sclerotized median cornutus and showing a fine apical serration. Octavals weakly sclerotized, w-shaped.

**FEMALE GENITALIA** (Fig. 880). Papillae anales comparatively small. Both pairs of apophyses thin, a. anteriores short, reaching only about one-third length of a. posteriores. Sterigma not modified. Antrum shell-shaped, slender. Corpus bursae pear-shaped; ductus bursae ribbed posteriorly; corpus membranous. Signum rather small, elliptical, with very short spicula.

**DIAGNOSIS.** The small size and very dark colour are characteristic. *C. angolae*, above, is somewhat similar but is smaller and paler, with orange suffusion on the underside of the wings.

**BIOLOGY.** Apparently associated with tropical forest. According to label data on Cameroon specimens, the species flies in both the rainy and dry season.

**DISTRIBUTION.** West to East Africa, found from Cameroon through Zaire to Uganda and Kenya. Available records are from widely isolated localities, suggesting wider distribution.

**MATERIAL.** 22♂ (1 dissected, Geometridae genitalia slide No. 16111) (BMNH) and 9♀ (1 dissected, Geometridae genitalia slide No. 16112) (BMNH). 20 London (BMNH), 2 Tervuren (MRAC), 8 Nairobi (NMKE), 1 Bulawayo (NMKE).

**LOCALITIES.** **Cameroon:** Bitje, Ja River, 2000 ft (19). **[Zaire]:** (Congo), Lulua, Kafakumba (2), Mazeze (1). **Uganda:** 20 m W. Kampala (1), Mabira Forest, Jinja (1), Kamengo, Mawakota (1), Kalinzu (1), Kayonza, Kigezi (1), Mpanga Forest, Mpigi (1), Kagera Sawmills, Masoka (1). **Kenya:** Kaimosi, Kakamega (1). **Tanzania:** Mihumo, Kigoma (1).

#### 75. *Chiasmia geminilinea* (Prout, 1932) comb. n.

Figs 309, 310; 657, 881; 1007

*Semiothisa?* *geminilinea* Prout, 1932a: 489. Holotype ♂, **[Kenya]:** Type; Afr[ique] or[rientale] angl[aise] (Wa-Taita), Bura (Alluaud & Jeannel) Mars 1912, 1050 m, St. 61; *Semiothisa geminilinea* Prout ♂ type; *Semiothisa geminilinea* Prout, Mém[oires] [de la] Soc[iété] ent[omologique] [de] France 1932, 26, p.000 (P. Viette Mai 1951) (MNHN) [examined].

*Semiothisa geminilinea* Prout; Fletcher, 1958a: 137; 1978a: 80; Herboulot, 1981: 224.

**FORE WING LENGTH.** 13 mm (♂), 14–16 mm (♀).

**ADULT** (Figs 309, 310). Medium-sized. Ground colour of wings whitish, irregularly dusted with grey, postmedian area appearing predominantly grey. Basal line practically absent, median line weak to clearly developed, but never well defined and more like a fascia. Postmedian line prominent, blackish, sharply angled on fore wing below costa. Discal spots faint. Postmedian area with a characteristic, oval black spot near anal margin; a smaller, rounded postmedian spot on fore wing. Underside whitish with faint grey dusting in basal and median areas; discal spots and median line present. Postmedian line greyish-brown, with whitish blotches along termen. Vestiture of thorax and abdomen ochreous grey. Hind tibia of ♂ not modified. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 657). Uncus horns and gnathos medium-sized. Valves elongated; costa straight, exhibiting a small and curved ventral process; sacculus very large, extended to form a conspicuous, drooping

process. Aedeagus stout and spindle-shaped; vesica displaying apical striations, but apparently lacking cornuti (a large patch of denser sclerotization present near apex). Octavals rather inconspicuous.

**FEMALE GENITALIA** (Fig. 881). Papillae anales rather small, pointed. Both pairs of apophyses relatively short, a. anteriores stouter, two-thirds length of a. posteriores. Sterigma: l. antevaginalis somewhat squarish. Antrum shell-shaped. Bursa copulatrix elongated, tubular; posterior part ribbed. Signum absent.

**DIAGNOSIS.** The pale colour and elliptical dark spot close to the anal angle of the hind wing are characteristic. Although very different externally, the male genitalia are closely approaching those of 77. *C. subvaria*, below (compare Figs 657, 658).

**BIOLOGY.** Label data of the few known specimens suggest a preference for mountainous habitats, but this requires confirmation. Adults have been collected in September and from November to January.

**DISTRIBUTION** (Fig. 1007). From East Africa (Rwanda, Kenya, and Tanzania) to south-east Zimbabwe (Escarpment area). The Zimbabwean specimens listed below constitute a new record for southern Africa.

**MATERIAL.** 24♂ (2 dissected, genitalia slides L 655, L 656) (NMBZ) and 22♀ (3 dissected, genitalia preparation No. 15 (ZMHB); No. 6 (MRAC); slide L 686 (NMBZ), 2 Tervuren (MRAC), 31 Berlin (ZMHB), 2 Munich (ZSBS), 8 Bulawayo (NMBZ), 3 C. Herbule collection.

**LOCALITIES.** **Rwanda:** Gabiro (2), SE., Rusumo, 1300 m (1). **Kenya:** Nairobi (1), Musthomo (1). **Tanzania:** no further data (1), Daressalam (1), Lindi (8), Ndanda/Lindi, 300 m (1), Lushoto (1), Tendaguru/Lindi (1), Mt. Meru, Momella, 1600–1800 m (1), Marungu, 1500 m (4), Mombo (6), Morogoro (5), Bumbuli (2), Mikindani (2), Viktoria Nyansa, Ukerewe Island (1), Mwanihana Forest, Ifakara (1), Ft. Ikoma (2). **Zimbabwe:** Busi Farm, Chippinga (2), Vumba Mts., Mutare (Umtali) (2).

#### 76. *Chiasmia abyssinica* sp. n.

Figs 311; 882

**TYPE MATERIAL.** Holotype ♀, [Ethiopia]: Abyssinia, Harrar, 1934 (J. Maurel), Muséum Paris; genitalia slide M. Krüger No. 27 (MNHN).

**FORE WING LENGTH.** 15 mm (♀ holotype).

**ADULT ♀** (Fig. 311). Well medium-sized. Apex of fore wing pointed, very slightly falcate; termen of hind wing crenulated, lacking 'tail'. Ground colour of wings

greyish-white, densely but somewhat irregularly striated with greyish-brown, leaving a broad, paler median fascia. In addition to striation, postmedian area suffused with grey. Lines, discal spots and interneurals poorly developed; postmedian line angled at about 90° below costa of fore wing. Preapical spot prominent, brown. Underside similar, but postmedian area suffused with ochreous brown rather than grey, rendering the contrast between light and darker areas more striking. Vestiture of thorax and abdomen concolorous with wings, ochreous grey, mixed with some darker scales.

**FEMALE GENITALIA** (Fig. 882). Papillae anales small, rather pointed. Apophyses relatively strong, a. anteriores more than two-thirds length of a. posteriores. Sterigma: l. antevaginalis forming a crescentic to rectangular, very weakly sclerotized shield; l. postvaginalis forming two pointed 'ears' on sides of antrum. Antrum shell-shaped, prominent. Bursa copulatrix taking the shape of a large, gradually widening tube. Ductus bursae ribbed. Signum elliptical, with numerous small spicula.

**DIAGNOSIS.** The ♀ is quite similar to *C. geminilinea*, above, but has the postmedian line simple, not double. In addition, it may be recognized by the presence of a signum on the corpus bursae which is lacking in the other species. Also similar are 58. *C. amarata* and 64. *C. deceptrix*, above. The females of these, however, show different markings on the underside..

**BIOLOGY.** According to label data, the only known specimen originates from a semiarid, mountainous area. No further information is available.

**DISTRIBUTION.** Only known from the Harrar area in eastern Ethiopia.

**ETYMOLOGY.** From Latin *abyssinicus* (-a, -um); pertaining to Abyssinia (now Ethiopia).

#### 77. *Chiasmia subvaria* (Bastelberger, 1907) comb. n.

Figs 312, 313; 658, 883; 1007

*Gonodela* [sic] *subvaria* Bastelberger, 1907: 157.

Holotype ♂, [Tanzania]: Ost-Afrika, Usambara (von Rolle); Wrll [or 11]; Warr[en] det.; T; Typus 136; Coll. Bastelberger; Typus/Lep. 443 [obliterated] 2717 *subvaria* (SMF) [examined].

*Gonodela* [sic] *cretiguttata* Bastelberger, 1909: 282. Holotype ♂, **Angola**: P[ungo] Andongo, 5.4.[18]75; 79. W7; Warr[?] det.; Typus/Lep. 442 [obliterated] 2676 *cretiguttata*; T.; Coll. Bastelberger (SMF) [examined]. **Syn. n.**

*Gonodela* [sic] *cretiguttata* Bastelberger; Fletcher, 1958a: 137 (cited as a synonym of *C. steniata*).

*Semiothisa* *subvaria* (Bastelberger); Herbule, 1954b: 324; Fletcher, 1958a: 137.

FORE WING LENGTH. 17–18 mm (both sexes).

**ADULT** (Figs 312, 313). Large. Fore wing narrow in ♂, broader in ♀; tail on hind wing not conspicuous. Ground colour of wings whitish, but appearing greyish-brown to brown due to heavy dusting. Examples from the southern part of the species' range appear to be lighter than east African specimens. A blackish mark present on fore wing where lines meet costa and immediately distal of postmedian mark; these are, however, only weakly developed in ♂. In addition, black maculae present on postmedian line of fore wing in ♀ and some ♂. Basal and median lines generally weak in both sexes, postmedian line double, ranging from clearly developed to virtually absent. Discal spots faint on fore wing, faint to well developed on hind wing. Underside: whitish, thickly speckled with grey to orange brown, greatly varying in intensity of colour. Discal spots usually clear, lines developed to a varying degree. Postmedian area more or less uniform grey brown to orange brown, with some whitish maculation. Thorax and abdomen greyish-brown, with some dark spots on dorsal side of abdomen. Hind tibia of ♂ dilated. Seta comb on A3 present.

**MALE GENITALIA** (Fig. 658). Uncus horns well developed; gnathos deeply emarginate, strongly elongated. Valves very long. Costa straight, with a large, bluntly pointed ventral process; sacculus extended to form a very conspicuous, drooping process. Aedeagus large, somewhat spindle-shaped; vesica with a group of cornuti near tip. Octavals very shallow, with strongly sclerotized tips.

**FEMALE GENITALIA** (Fig. 883). Papillae anales prominent. Both pairs of apophyses slender, a. anteriores just over half length of a. posteriores. Sterigma with l. postvaginalis forming complex sclerotizations around and above the narrow antrum. Bursa copulatrix pear-shaped with short, strongly ribbed ductus, gradually widening into the large, membranous corpus. Signum large, situated near centre of corpus.

**DIAGNOSIS.** Although there exists some variation in the development of markings, *C. subvaria* is not likely to be confused with similar species on account of its size alone. In most examples, the clear, blackish, double postmedian line is characteristic. The ♂ is distinguished by a large hair-pencil on the hind tibia.

**BIOLOGY.** A forest species with afromontane distribution. Adults have been collected from February to April and in November–December.

**DISTRIBUTION** (Fig. 1007). From West (Cameroon, Ivory Coast, Angola) and East Africa (Rwanda, Uganda, Tanzania and Kenya) to south-eastern Zimbabwe (Mount Selinda, Vumba Mountains).

**MATERIAL.** 34♂ (1 dissected, TM genitalia slide No. 10835) and 33♀ (1 dissected, TM genitalia slide No.

10836), 8 London (BMNH), 2 Berlin (ZMHB), 12 Bulawayo (NMBZ), 12 Pretoria (TM), 14 Nairobi (NMKE), 5 Munich (ZSBS), 11 C. Herbulot collection, 3 D.H. Jacobs collection.

**LOCALITIES.** **Tanzania:** Tanganjika, Lushoto (1), Usambara Mts., Sakarami, 1500 m (2), Amani (3), Kabira Forest, Ruanda Distr., 12 m N. Usambara, 7000 ft (1). **Kenya:** Kakamega (1), Nairobi (1), N. Kavirondo, Maramas Distr., Ilala, 4500 ft (1). **Uganda:** Kayonza, Kigezi (5), Kalinzu Forest, Ankole (2), 20 m W. Kampala (1), Mabira Forest, Jinja (2), Bwamba Toro (1). **Rwanda:** SW., Nyungwe Forest, Delvaux road at km 20 (3), Nyungwe village, 2000 m (4), Wincka, 2700 m (3). **Zimbabwe:** Mount Selinda (27), Vumba (1). **Angola:** NW., Prov. Nordcuanza, Canzele, 30 km N. Quicolungo (1), N'Dalla Tondo, 2700 ft (1), Pungo Andongo (2). **Cameroon:** Gr[ößer] Kamerunberg, Buea, 1000–1200 m (1). **Ivory Coast:** Bingerville (2), Lamto, bords de la Bandama (1).

### 9. *Chiasmia aestimaria*-group

This group comprises 19 barely medium-sized to large species (fore wing length 11–18 mm) of ochreous, greyish or brown coloration which are closely related to the preceding group, but differ in the extreme development of the female antrum (Figs 884–898); this is also the autapomorphy uniting members of the *aestimaria*-group. In the male genitalia, the sacculus is broadly triangular or has the tip produced into a more or less prominent process. The range of the group includes parts of the Palaearctic (Mediterranean area, Asia minor, Central Asia) and the Afrotropical region including Madagascar.

**MALE GENITALIA** (Figs 659–677). Uncus horns large; gnathos deeply emarginate, delicate to rather robust. Valve massive; costa straight or slightly recurved, with or without ventral process, and not dilated apically. Sacculus broadly triangular and occasionally termen drawn into short, curved process or square, about twice width of costa and with termen forming a conspicuous, finger-like process (this is, however, rudimentary in 96. *C. fitzgeraldi*). In 89. *C. buettikeri* sacculus appearing twisted (Fig. 670). Saccus broad, evenly rounded and not protruding far beneath valvae. Aedeagus in most species tapering posteriorly. Arrangement of cornuti on vesica variable but frequently consisting of broad median cornutus and some microcornuti. Octavals greatly developed and either furcate with rounded tips or rounded and not showing any cleft.

**FEMALE GENITALIA** (Figs 884–898). Papillae anales and apophyses normal to relatively weak. Sterigma: lamella antevaginalis a plain shield-shaped sclerotization or unmodified; l. postvaginalis forming sclerotizations on sides of antrum (90. *collaxata* to 96. *fitzgeraldi*) or unmodified (78. *aestimaria* to 89. *buettikeri*). Antrum

greatly developed, cylindrical to funnel-shaped, and, with the exception of *C. fitzgeraldi*, equalling remainder of ductus bursae in length. Bursa copulatrix either resembling a wide tube of variable length and then bursa wall membranous or fairly tough, but always lacking signum or pear-shaped, stout to fairly elongated and bearing a large, circular signum.

## Key to species

- 1 Moths small to large (Figs 314–338). ♂ genitalia with sacculus broadly triangular (Figs 663–669) or produced into short (Figs 659–662) or somewhat longer, twisted process (Fig. 670). ♀ genitalia (Figs 884–892) lacking sterigma and signum ..... 2
- Moths large (Figs 339–355). ♂ genitalia with sacculus produced into prominent process (Figs 671–677). ♀ genitalia (Figs 893–898) with sterigma forming sclerotizations on sides of antrum and signum present ..... 13
- 2(1) Small moths (fw length 11–13 mm) (Figs 314–318). ♂ genitalia with saccus produced into finger-like, drooping process (Figs 659–662). ♀ genitalia, where known, as in Figs 884–886. Palaearctic, reaching Senegal ..... 3
- Medium to large moths (fw length 12–18 mm) (Figs 319–338). ♂ genitalia (Figs 663–670) with saccus not as above. ♀ genitalia (Figs 887–892) not as above. Afrotropical, two species in Arabia ..... 6
- 3(2) Darker, more olivaceous species with well developed lines (Figs 314, 315). Aedeagus without dorsal sclerotized ridge (Figs 659, 660) ..... 4
- Paler, more ochreous species with indistinct lines (Figs 316–318). Aedeagus dorsally with a sclerotized, toothed ridge (Figs 661, 662) ..... 5
- 4(3) Moths without extensive dark suffusion (Fig. 314). ♂ genitalia with arrangement of cornuti as in Fig. 659; ♂ abdomen with octavals rather robust. ♀ genitalia with bursa copulatrix fairly small, wall strongly ribbed (Fig. 884) ..... 78. *aestimaria* (Hübner), p. 186
- Moths with extensive dark suffusion (Fig. 315). ♂ genitalia with arrangement of cornuti as in Fig. 660; ♂ abdomen with octavals more delicate. ♀ genitalia with bursa copulatrix much larger, wall more membranous (Fig. 885) ..... 79. *sareptanaria* (Staudinger), p. 187
- 5(3) ♂ genitalia with configuration of cornuti on vesica and shape of juxta as in Fig. 661. ♀ genitalia with extremely developed antrum (Fig. 886) ..... 80. *syriacaria* (Staudinger), p. 188
- ♂ genitalia with configuration of cornuti on vesica and shape of juxta as in Fig. 662. ♀ unknown ..... 81. *tenuiata* (Staudinger), p. 189
- 6(2) Adult as in Figs 337, 338. ♂ genitalia with ornate, somewhat twisted saccus (Fig. 670); ♀ genitalia with lamella antevaginalis strongly modified (Fig. 892). Saudi Arabia and Ethiopia ..... 89. *buettkeri* (Wiltshire), p. 195
- Adults not as in Figs 337, 338. ♂ genitalia with saccus rounded or more or less triangular, not twisted (Figs 663–669); ♀ genitalia with l. antevaginalis not modified or consisting of two narrow slits (Figs 887–891). One species reaching Yemen, otherwise African mainland and Madagascar ..... 7
- 7(6) Sacculus very broad and triangular, apex well rounded; aedeagus lacking true cornuti (Figs 663, 668, 669). ♀ genitalia, where known, with contour of antrum pentagonal (Figs 887, 891). Distributed on African mainland, one species with a Madagascan subspecies ..... 8
- Sacculus rounded, termen produced into short, drooping process (Fig. 667) or, if triangular, termen produced into short, ascending process (Figs 664–666); aedeagus carrying at least one broad cornutus. ♀ genitalia, where known, with antrum of different shape (Figs 888–890). Four species, endemic to Madagascar ..... 10
- 8(7) ♂ abdomen with furcate octavals narrow (Figs 668, 669). ♀ genitalia, where known, as in Fig. 891. One species in East Africa, one species in westernmost Zaire ..... 9
- ♂ abdomen with furcate octavals broadly arcuate (Fig. 663). ♀ genitalia as in Fig. 887, not as above. Widespread in Afrotropical region including Madagascar; Yemen ..... 82. *streniata* (Guenée), p. 189
- 9(8) Adults occurring in two forms (Figs 333–336), but with relatively pale markings. ♂ abdomen with tips of octavals pointed (Fig. 669). ♀ unknown. East Africa ..... 88. *parastreniata* sp. n., p. 195
- Adults occurring in one form only (Figs 331, 332), dark with heavy markings. ♂ abdomen with tips of octavals spatulate (Fig. 668). ♀ genitalia as in Fig. 891. Westernmost Zaire ..... 87. *angolaria* (Snellen), p. 194
- 10(7) Adults ochreous, termen of hind wing with well-developed tail (Figs 329, 330). Sacculus rounded, termen produced into short, drooping process (Fig. 667); aedeagus with elongated cornutus. ♀ genitalia with posterior margin of antrum circular (Fig. 890) ..... 86. *tetragraphicata* (Saalmüller), p. 194
- Adults not as above (Figs 323–328). Sacculus triangular, termen produced into ascending process (Figs 664–666); aedeagus with stout cornutus. ♀ genitalia, where known, having posterior margin of antrum somewhat curved (Figs 888, 889) ..... 11

- 11(10) Adults as in Figs 327, 328. ♂ abdomen with octavals relatively deeply cleft (Fig. 666). ♀ unknown ..... 85. *tsaratanana* (Viette), p. 193
- Adults not marked as above (Figs 323–326). ♂ abdomen with octavals much shallower (Figs 664, 665). ♀ genitalia as in Figs 888, 889 ... 12
- 12(11) Adults whitish-grey, with conspicuous wing pattern (Figs 325, 326). ♂ genitalia with sacculus acutely pointed; aedeagus elongated; tips of octavals as in Fig. 665. ♀ genitalia with short corpus bursae (Fig. 889) ..... 84. *hypactinia* (Prout), p. 192
- Adults dark grey, not patterned as above (Figs 323, 324). ♂ genitalia with sacculus less pointed than in *hypactinia*; aedeagus stouter; tips of octavals as in Fig. 664. ♀ genitalia with very long corpus bursae (Fig. 888) ..... 83. *herbuloti* (Viette), p. 191
- 13(1) Moths strikingly marked in black and white (Figs 354, 355). ♂ genitalia (Fig. 677) with long digitate ventral process on costa; process of sacculus rudimentary. ♀ genitalia (Fig. 898) elongated. Northern Zambia, Zaire; Tanzania ..... 96. *fitzgeraldi* (Carcasson), p. 200
- Moths much less strikingly marked, mostly dark brown and grey (Figs 339–353). ♂ and ♀ genitalia not as above. Widely distributed but absent from southern Africa and Madagascar ..... 14
- 14(13) Adult as in Figs 339, 340. ♂ genitalia (Fig. 671) with short, strongly tapering costa and short and stout aedeagus. ♀ unknown. Cameroon; Zaire; Uganda ..... 90. *collaxata* (Herbulot), p. 196
- Moths may be similar but less chocolate brown. ♂ genitalia not as in Fig. 671. ♀ genitalia as in Figs 893–897 ..... 15
- 15(14) Moths (Figs 349–351) with ochreous-golden spot in position of interneurals; underside black and white. ♂ genitalia (Fig. 675) with process of sacculus long, slender, and only slightly curved; octavals rather pointed. ♀ genitalia (Fig. 896) with antrum as illustrated. From West to East Africa (Cameroon, Angola, Zaire, Rwanda, Uganda and Tanzania) ..... 94. *pernuptera* (Prout), p. 199
- Moths (Figs 341–348, 352, 353) not so marked; underside with *amarata*-pattern (e.g., Fig. 346). ♂ and ♀ genitalia not as above ..... 16
- 16(15) Moths (Figs 341–343) with characteristic, pale orange postmedian fascia with long, dark striae. ♂ genitalia (Fig. 672): process of sacculus strongly developed, with kink near middle; octavals as illustrated. ♀ genitalia (Fig. 893) with antrum funnel-shaped. West to East Africa ..... 91. *ostentosaria* (Möschler), p. 197
- Moths lacking pale orange postmedian fascia (Figs 344–348, 352, 353). ♂ genitalia (Figs 673, 674, 676) and ♀ genitalia (Figs 894, 895, 897) not as above. West to East Africa ..... 17
- 17(16) ♂ genitalia (Fig. 673) with w-shaped, broadly rounded octavals. ♀ genitalia as in Fig. 894. West and East Africa (Nigeria, Cameroon, Ivory Coast; Uganda, Tanzania) ..... 92. *impar* (Warren), p. 197
- ♂ genitalia (Figs 674, 676) with distal margin of octavals entire, convex. ♀ genitalia (Figs 895, 897) not as above ..... 18
- 18(17) Adult as in Figs 352, 353. ♂ genitalia (Fig. 676) with aedeagus acutely pointed; vesica bearing a small median cornutus. ♀ genitalia (Fig. 897) compact, with well-rounded corpus bursae; antrum broadly funnel-shaped. West and East Africa ..... 95. *albivia* (Prout), p. 199
- Adult as in Figs 347, 348. ♂ genitalia (Fig. 674) with apex of aedeagus rather blunt, terminating in a small, three-pronged sclerotization. ♀ genitalia (Fig. 895) elongated, with antrum subcylindrical. Zaire and Uganda ..... 93. *grandis* sp. n., p. 198

### 78. *Chiasmia aestimaria* (Hübner, [1809]) comb. n.

Figs 314; 659, 884

*Geometra aestimaria* Hübner, [1809] 5: pl. 64, Fig. 333. Type(s): lost (M. Lödl, *in litt.*) [not examined].

Although the type material is no longer in existence, the quality of Hübner's illustration is sufficient to establish the species' identity.

*Pharmacis aestimaria* (Hübner); Hübner, 1823: 298.  
*Ennomos aestimaria* (Hübner); Treitschke, 1827: 18;

Freyer, 1832: 77 [for the dates of Freyer's publications, see Tremewan (1988).]

*Philobia aestimaria* (Hübner); Duponchel, 1829: 209.

*Macaria aestimaria* (Hübner); Herrich-Schäffer, 1844: 51; Guenée, [1858]: 86; Walker, 1861: 881; Staudinger & Wocke, 1871: No. 2303; Prout *in* Seitz, 1915: 347; Prout, 1921: 190; Andres & Seitz, 1924: 79.

*Macaria contemptata* Guenée, [1858]: 86. Syntypes 1♂, 1♀ [?Canada]: Amerique septentrionale [Europe] (not traced in BMNH or MNHN) [not examined].

*Macaria contemptata* Guenée; Walker, 1862: 884; Packard, 1876: 294.

‡*Macaria aestimata* (Hübner); Herrich-Schäffer, 1861: 15. An incorrect subsequent spelling.

*Semiothisa contemptata* (Guenée); Smith, 1891: No. 3601.

*Semiothisa aestimaria* (Hübner); Staudinger & Rebel,

1901: 333; Spuler, 1910: 97; Berge, 1910: 395; Wiltshire, 1939: 48; Rungs, 1981: 261; Hausmann, 1991: 137.

‡*Macaria aestimaria* (Hübner); Amsel, 1935: 245.  
An incorrect subsequent spelling.

*Macaria aestimaria tunesiella* Lucas, 1949: 96.  
Lectotype ♀, **Tunisia**: Sfax (Tunisie), 14.V.1949; Type décrit dans le Bulletin de la Sté. Entomologique de France en 1949 [C. Herbolut collection] [not examined]. See Remarks.

*Semiothisa (Godonela) aestimaria* (Hübner); Wehrli in Seitz, 1940: 384.

FORE WING LENGTH. 12–13 mm (♂), 12 mm (♀).

ADULT (Fig. 314). Medium-sized. Termen of hind wing crenulated, with the trace of a tail. Ground colour of wings whitish, densely dusted with brownish-grey, leaving median area paler in ♂; ♀ wholly suffused with grey. Postmedian area somewhat darker, with a whitish, undulating line, more pronounced in ♂. All three lines present on fore wing, but only postmedian well developed, angled below costa of fore wing. On hind wing, basal line absent. Discal and preapical spots present, dark. Underside white with intense greyish-brown suffusion, upperside markings shining through, faint. Postmedian area more or less entirely filled by a broad, greyish-brown fascia. Hind tibia of ♂ not modified. Setal comb on A3 absent.

MALE GENITALIA (Fig. 659). Uncus horns and gnathos normally developed. Costa of valve slightly recurved, without ventral process. Sacculus well developed, about thrice width of costa, its tip extended to form a fairly prominent process. Aedeagus relatively short, cylindrical; vesica with the following arrangement of cornuti: one long, rod-shaped median cornutus reaching from apex beyond middle; an apical group of 14 microcornuti arranged in four rows; a smallish cornutus bearing several denticles below tip of median cornutus; three very small cornuti running across vesica near middle of median cornutus; and a small cornutus situated atop end of median cornutus. Octavals broadly arcuate and rather shallow.

FEMALE GENITALIA (Fig. 884). Papillae anales well developed. Both pairs of apophyses slender, a. anteriores barely more than half length of a. posteriores. Sterigma not particularly modified. Antrum very large, broadly funnel-shaped. Bursa copulatrix small, tubular and somewhat constricted near middle; wall of bursa strongly ribbed. Signum absent.

EARLY STAGES. I have not seen any material of this species. Prout in Seitz (1915) describes the larva as ‘variable, green with white lines and yellow maculae on sides’; he further gives the food-plant as *Tamarix gallica* (Tamaricaceae); to this, Wehrli in Seitz (1940), citing L’Homme, adds *Myrica gale*.

DIAGNOSIS. *Chiasmia aestimaria* resembles 79. *C. sareptanaria*, below, to which it is closely related. However, apart from small differences in the structure of the genitalia, *aestimaria* is easily recognized by its much less heavy markings.

BIOLOGY. Adults are on the wing in April–May and July–September (Prout in Seitz, 1915). Around the Mediterranean, the species is apparently associated with Macchia-like habitats.

DISTRIBUTION. From southern Europe and North Africa to the Middle East.

MATERIAL. 7♂ (1 dissected, genitalia slide No. 11221) (TM) and 9♀ (1 dissected, genitalia slide No. 11222) (TM), 12 London (BMNH), 2 Paris (MNHN), 2 Pretoria (TM).

LOCALITIES. **Spain:** Zaragoza (1). **France:** Marseille (1), Digne (1). **[Yugoslavia]:** Dalmatia, no further data (1). **[Israel]:** Palestine, Akka (1). **Egypt:** Port Said (1). **Tunisia:** Philippville (2). **Algeria:** Sidi Ferruch (1), Prov. Oran, Sidi-bel-Abbes (4). **[Turkey]:** (Asia minor), Broussa (3).

REMARKS. As *C. sareptanaria* has surprisingly been found in West Africa (Senegal), there was some doubt as to the status of the taxon *tunesiella* Lucas, which in wing markings is somewhat intermediate between typical *aestimaria* and the very dark *sareptanaria*. However, C. Herbolut kindly checked the type of *tunesiella* on my behalf and confirms that it is a synonym of *aestimaria*, although he affords it subspecific rank. As I have not seen sufficient material of *aestimaria* from the North African part of its range I do not feel able to express a view about the validity of a subspecies *tunesiella*.

### 79. *Chiasmia sareptanaria* (Staudinger, 1871) comb. et stat. n.

Figs 315; 660, 885

*Macaria aestimaria sareptanaria* Staudinger, 1871:  
160. LECTOTYPE ♂, here designated, **[Russia]:** Sarepta [= Saratow]; Origin[al]; Zool[ogisches] Mus[eum] Berlin; genitalia slide M. Krüger No. 20 (ZMHB) [examined]. Paralectotypes (1 ♀, **[Russia ?]:** (small green disk without text); Origin[al]; Zool[ogisches] Mus[eum] Berlin (ZMHB)).

*Semiothisa aestimaria sareptanaria* (Staudinger); Staudinger & Rebel, 1901: 333; Spuler, 1910: 97; Wiltshire, 1939: 11; 1962: 796; 1985: 43; 1990: 133.

*Macaria aestimaria sareptanaria* (Staudinger); Prout in Seitz, 1915: 348.

*Semiothisa (Godonela) aestimaria sareptanaria* (Staudinger); Wehrli in Seitz, 1940: 384.

FORE WING LENGTH. 12–13 mm ( $\delta$ ), 12 mm ( $\vartheta$ ).

ADULT (Fig. 315). Small. Termen of hind wing crenulated, with a very short tail. Ground colour of wings cream white, striated with dark brown and with extensive brown suffusion covering most of postmedian area. Basal and postmedian area well developed on fore wing, both acutely angled below costa; median weak. Hind wing with median and postmedian only. Discal spots present but not conspicuous. Preapical spot prominent. Postmedian area of both wings with a dark, elliptical spot, larger on hind wing. Underside similar, but striation and suffusion much lighter, pale olive. Postmedian line on fore wing and discal spots shining through. Vestiture of thorax and abdomen ochreous grey, mixed with darker scales; small, dark maculae present on dorsum of A2–3. Hind tibia of  $\delta$  not dilated. Setal comb on A3 absent.

MALE GENITALIA (Fig. 660). Uncus horns of medium size; gnathos normal. Costa of valve straight, not dilated apically and lacking ventral process. Sacculus large, angular, about thrice width of costa; apex extended to form prominent process. Aedeagus fusiform; vesica with the following arrangement of cornuti: one long, rod-like cornutus extending from centre of aedeagus to tip; one small, irregularly shaped cornutus a short distance behind; two cornuti situated below rod-like cornutus, the anterior one with a row of four well-sclerotized teeth, the posterior one smooth. Octavals broadly arcuate, very shallow.

FEMALE GENITALIA (Fig. 885). Papillae anales prominent. Both pairs of apophyses fairly stout, a. anteriores more than two-thirds length of a. posteriores. Sterigma hardly modified; l. postvaginalis not forming any sclerotizations. Antrum funnel-shaped, massive and strongly chitinized. Bursa copulatrix large, somewhat hour glass-shaped and with posterior half of bursa wall more strongly sclerotized. Signum absent.

DIAGNOSIS. The male genitalia of this species are very similar to those of *C. aestimaria*, above, the main difference being found in the configuration of the cornuti (compare Figs 659, 660). In facies, however, *C. sareptanaria* is quite distinct, being characterized by its heavy markings.

DISTRIBUTION. Disjunct: the species has been found in Senegal, Saudi Arabia and Oman and from Russia to central Asia. See also Remarks.

MATERIAL. 4 $\delta$  and 10 $\vartheta$  (1 dissected, Geometridae genitalia slide No. 17521) (BMNH). 11 London (BMNH), 3 C. Herbulot collection.

LOCALITIES. **Senegal:** Cap Vert (2). **Saudi Arabia:** Najran (2), Wadi Amq (1), Qum Fida (1), Qanuna, Assi (4). **Russia:** Saratow (Sarepta) (2). **Kazakhstan:** Syr-Darja, Baigacum (1). **Turkmenistan:** SE., Serahs (1).

REMARKS. In central Asia (Kuldscha) the species is represented by ssp. *kuldschana* (Wehrli) (similarly dark as nominotypical *sareptanaria*, but lines weaker and striation even more intense).

### 80. *Chiasmia syriacaria* (Staudinger, 1871) comb. n.

Figs 316, 317; 661, 886

*Macaria aestimaria syriacaria* Staudinger, 1871: 160.

LECTOTYPE  $\delta$ , here designated, **Cyprus:** Cypern; Coll[ectio] Led[erer], *Aestimaria*; Origin[al]; Zool[ogisches] Mus[eum] Berlin; genitalia slide M. Krüger No. 19 (ZMHB) [examined]. Paralectotypes (2 $\delta$ , 1 $\vartheta$ ). 1 $\vartheta$ , **Cyprus:** Cypern; Coll[ectio] Led[erer], *Aestimaria*; Origin[al]; Zool[ogisches] Mus[eum] Berlin. 1 $\delta$ , **[Lebanon]:** Beirut; Coll[ectio] Led[erer], *Aestimaria*; Origin[al]; Zool[ogisches] Mus[eum] Berlin. 1 $\delta$  [**?Syria:**] Syrien; Coll[ectio] Led[erer], *Aestimaria*; Origin[al]; Zool[ogisches] Mus[eum] Berlin (ZMHB).

*Semiothisa aestimaria syriacaria* (Staudinger); Staudinger & Rebel, 1901: 333; Spuler, 1910: 97.

*Macaria venerata* Christoph, 1887: 94. Type material: 4 $\delta$  syntypes. 2 $\delta$ , **[Iran]:** Nordpersien, Schahrud; 1 $\delta$ , **[Turkmenistan]:** Askhabad; 1 $\delta$ , **[Armenia]:** Kasikoparan (Petersburg Museum?) [not examined].

**‡***Macaria syriacata* Staudinger; Prout in Seitz, 1915: 348. Misspelling.

*Macaria venerata* Christoph; Prout in Seitz, 1915: 348 (synonymy).

*Semiothisa syriacaria* (Staudinger); Wiltshire, 1939: 11; 1962: 796; 1990: 134; Hausmann, 1991: 137.

*Semiothisa (Godonela) syriacaria* (Staudinger); Wehrli in Seitz, 1940: 384.

FORE WING LENGTH. 10–11 mm ( $\delta$ ), 11–12 mm ( $\vartheta$ ).

ADULT (Figs 316, 317). Small. Termen of hind wing crenulated, with a very short tail. Wings cream white with sparse brown striation in  $\delta$ ;  $\vartheta$  with dense and even, light brown suffusion and darker dusting. Postmedian area darker in  $\vartheta$ , leather brown. Basal and median line virtually absent. Postmedian line better developed, brown, nearly straight, but not reaching costa of fore wing. Discal spots present but faint. Preapical spot very faint to absent. Underside cream white ( $\delta$ ) or yellowish ochre with darker dusting ( $\vartheta$ ); markings similar to upperside. Vestiture of thorax and abdomen concolorous with wings. Hind tibia of  $\delta$  not modified. Setal comb on A3 absent.

MALE GENITALIA (Fig. 661). Uncus horns well developed; gnathos normal. Costa of valve slightly recurved, free part shorter than in preceding two species. Sacculus large and angular; outer margin extended

to form short process. Aedeagus large relative to remainder of genitalia; apical portion forming a well sclerotized tip, armed with two heavily sclerotized teeth. Vesica bearing a small median cornutus and several microcornuti. Octavals arcuate, rather shallow.

**FEMALE GENITALIA** (Fig. 886). Papillae anales well developed, rounded and densely setose. Both pairs of apophyses rather strong; a. anteriores rather more than two-thirds length of a. posteriores. Sterigma not modified. Antrum massively developed, equalling ductus bursae in diameter. Bursa copulatrix taking the shape of a short, fairly wide tube. Posterior part, corresponding to ductus bursae, ribbed; anterior part (= corpus bursae) membranous. Signum absent.

**EARLY STAGES.** Wehrli *in Seitz* (1940), referring to an illustration by Wiltshire (1939), gives a description of the mature larva and the egg which translates as follows: 'occurs in a green and a brown form, the latter with an olive-grey head, clouded with brown and with black maculae; several poorly defined, pale dorsal and subdorsal lines and a more distinct yellow lateral line; the former having a green head with faint black maculation, a rather broad, greyish-green dorsal line, pale subdorsals bordered by green, and a mixed, yellow-and-white lateral line. Egg pale green, elongated-oval, with reticulate sculpture. Duration of egg stage, 4 days; of larval stage, 12 days.'

**DIAGNOSIS.** A very pale species, particularly the ♂. Some similarity exists with *C. aestimaria*, above, but that species is darker and has a better developed fore wing postmedian and preapical spot.

**BIOLOGY.** In Iraq, the larva was found on *Prosopis stephaniana*; in captivity it will accept *Glycyrrhiza* sp. (Wehrli, loc.cit.). From Saudi Arabia, Wiltshire (1990) records *Prosopis farcta* and *Glycyrrhiza glabra* as host plants. In Israel, adults have been collected in March and June.

**DISTRIBUTION.** From Cyprus and the Middle East through parts of Arabia to Armenia.

**MATERIAL.** 7♂ (1 dissected, Geometridae genitalia slide No. 16155) (BMNH) and 17♀ (2 dissected, Geometridae genitalia slides No. 16156, 17520) (BMNH). 24 London (BMNH).

**LOCALITIES.** [Israel]: Palestine(1); Ghorel Safieh, S. end of Dead Sea(7). **Bahrain:** Fala(1). **Syria:** Akbes(1). **Iraq:** Kut al Amara/Amara, River Tigris(14).

### 81. *Chiasmia tenuiata* (Staudinger, 1901) comb. et stat. n.

Figs 318; 662

*Macaria aestimaria tenuiata* Staudinger, 1901: 333.

**LECTOTYPE** ♂, here designated, [*Sine patria*]: *venerata* Mar[??]; Origin[al]; v[ariatio] (et ab[erratio]) *Tenuiata* Stgr; Zool[ogisches] Mus[eum] Berlin; genitalia slide M. Krüger No. 21 (ZMHB) [examined]. Paralectotype (1♂). [**Lebanon**]: Beirut Led[erer ?]: 60.; Coll[ectio] Möschl[er]; Origin[al]; Zool[ogisches] Mus[eum] Berlin (ZMHB).

*Semiothisa aestimaria* v. (ab.) *tenuiata* (Staudinger); Spuler, 1910: 97.

*Macaria syriacata* [sic] ab. *tenuiata* Staudinger; Prout *in Seitz*, 1915: 348.

*Semiothisa (Godonela) syriacaria* ab. et var. *tenuiata* (Staudinger); Wehrli *in Seitz*, 1940: 384.

**FORE WING LENGTH.** 10–11 mm (♂), 11–12 mm (♀).

**ADULT** (Fig. 318). Small. Termen of hind wing gently crenulated, with a very short tail. Ground colour of wings pale ochre, irregularly dusted with light brown, particularly along fore wing costa and at bases of both wings. Postmedian area with some light brown suffusion. Basal and median line entirely absent; postmedian marked by broad, blackish streaks, those on fore wing scarcely reaching beyond cell. Discal spots very faint. Underside ochreous yellow, with light brown dusting and striation, densest along fore wing costa. Postmedian streaks shining through, wings otherwise markingless. Vestiture of thorax and abdomen concolorous with wings. Hind tibia of ♂ not dilated. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 662). Uncus, gnathos and valves as described for *C. syriacaria*. Aedeagus long relative to rest of genitalia, slightly curved. Vesica with a very small median cornutus and a large and broad apical cornutus bearing several teeth. Octavals arcuate, tips well sclerotized.

**DIAGNOSIS.** The only specimen seen (the lectotype) is easily recognized on account of the bold dark streaks along the postmedian line on otherwise markingless wings. The male genitalia of *syriacaria* and *tenuiata* are very similar, but can be separated by the different arrangement of cornuti on the vesica (compare Figs 661, 662).

**DISTRIBUTION.** Given by Staudinger & Rebel (1901) as 'Hyrcania et Tura, Sarawschan, Syria'. The region Syria is defined in the gazetteer as 'besonders nur das nördliche Syrien mit Beirut und dem Libanon.' If correct, *C. tenuiata* and *syriacaria* would occur sympatrically in this area. However, no material of *tenuiata* from this region was available for examination.

**MATERIAL.** Only the lectotype was seen.

### 82. *Chiasmia steniata steniata* (Guenée, [1858]) comb. n.

Figs 319–322; 663, 887; 1008

*Macaria steniata* Guenée, [1858]: 87. LECTOTYPE ♂, here designated, [Ethiopia]: 490. 50; *steniata* ♂; *Macaria steniata* Guen. X.87: Type; Muséum Paris, Abyssinie (Schimper 1850) (MNHN) [examined]. Paralectotype (1 ♀). [Ethiopia]: *steniata* ♀; Allotype; Muséum Paris, Abyssinie (Schimper 1850); 490.50 (MNHN) [examined].

*Macaria steniata* Guenée; Walker, 1861: 921; Janse, 1917: 114.

*Macaria amandata* Walker, 1861: 922. Holotype ♀ Congo: Congo/43 56; 97. *Macaria amandata* (BMNH) [examined].

*Semiothisa amandata* (Walker); Swinhoe, 1904: 505. *Gonodela* [sic] *lunivallata* Warren, 1905b: 402. Holotype ♂, Sierra Leone: Moyamba, March [19]03 (D. Cator); *Gonodela* [sic] *lunivallata* Type ♂ Warr./ XII p. 402; Rothschild Bequest B.M. 1939-1 (BMNH) [examined].

*Macaria amandata* Walker; Hampson, 1910: 468 (as good species); Fletcher, 1958a: 136 (synonymy).

*Semiothisa steniata* (Guenée); Janse, 1932: 229; Prout, 1935: 11; Fletcher, 1958a: 136; 1978a: 80; Herbulot, 1981: 224.

*Semiothisa steniata* forma *amandata* (Walker); Janse, 1932: 230.

*Gonodela* [sic] *lunivallata* Warren; Janse, 1932: 229; Fletcher, 1958a: 137 (synonymy).

FORE WING LENGTH. 13–16 mm (both sexes).

ADULT (Figs 319–322). A broad-winged, variable species. Hind wing without tail. Ground colour whitish to pale ochreous with intense dark dusting and irroration; all intermediates between light ochreous grey and dark slate grey occur. Basal and median lines faint to moderately well developed; postmedian line mostly prominent, angled at about 90° below costa of fore wing. Postmedian area frequently somewhat darker, occasionally a round blackish spot present near anal angle of hind wing. Underside highly characteristic, white and yellow with dense brown irroration and a reticulate line pattern. Postmedian area predominantly brown. Body ochreous grey to grey, dorsal side of abdomen with small blackish maculae. Hind tibia of ♂ not modified. Seta comb on A3 absent. Variation: pale, frequently slightly ochreous specimens with reduced markings are referable to f. *amandata* (Walker). This appears to be the dry season (winter) form.

MALE GENITALIA (Fig. 663). Uncus horns well developed; gnathos with fairly large medial element. Costa of valve long, nearly straight and somewhat dilated apically; ventral process absent. Sacculus large, broadly triangular. Aedeagus large and rather stout; vesica with a granulose patch near apex but lacking cornuti. Octavals large, very broadly arcuate.

FEMALE GENITALIA (Fig. 887). General appearance stout. Papillae anales rounded. Apophyses slender, a.

anteriores about two-thirds length of a. posteriores. Antrum short and massive, somewhat pentagonal. Bursa copulatrix resembling a short and wide tube, exhibiting a constriction one third from antrum. Posterior part, corresponding to ductus bursae, strongly ribbed; anterior part (= corpus bursae) membranous. Signum absent.

EARLY STAGES. The following description of a mature larva is after a transparency provided by N.J. Duke. Larva. Fourth instar: very colourful and possibly aposematic (Fig. 5). Head white, entire surface with conspicuous black patches. Body: ground colour also whitish; back with lilac dorsal line and two fine addorsals of same colour. Sides with black subdorsal and lateral and brownish subventral line; in addition bright yellow and black spots present. Ventral area apparently black throughout. Thoracic legs black, prolegs on A6 white suffused with reddish, those on A10 white with yellow and black maculation. Pupa: cremaster as in Fig. 6j.

DIAGNOSIS. *Chiasmia steniata* is best recognized by its broad wings, grey coloration and, most importantly, yellowish-brown underside of the hind wings. A similar species is 88. *C. parasteniata*, which, however, has a much more restricted range. The differences in male genitalia structure are evident from the illustrations (compare Figs 663 and 669).

BIOLOGY. The larva was reared by N.J. Duke on *Hippobromus pauciflorus* (L.f.) Radlk. (Sapindaceae), as well as on *Acacia karroo* Hayne (Taylor, 1953). According to label data it also feeds on wattle (several introduced Australian species of *Eucalyptus*). Adults have been collected in all months of the year except June. The species exhibits seasonal dimorphism, f. *amandata* being the pale winter (dry season) form (see above).

DISTRIBUTION (Fig. 1008). Widely distributed in the Afrotropical region and also recorded from south-west Arabia (Yemen). In southern Africa found along the southern Cape coast, in KwaZulu-Natal, including the former territory of Transkei, the Transvaal and Zimbabwe. *C. steniata* is absent from more arid regions.

MATERIAL. 147♂ (5 dissected, TM genitalia slides No. 977, 977a, 10814, 10986, 11220, 12975) and 124♀ (2 dissected, TM genitalia slides No. 10987, 11144). 1 Paris (MNHN), 4 Berlin (ZMHB), 9 Munich (ZSBS), 164 Pretoria (TM), 4 Pretoria (SANC), 13 Cape Town (SAM), 32 Bulawayo (NMBZ), 7 Nairobi (NMKE), 4 C. Herbulot collection, 19 N.J. Duke collection, 15 H.S. Staude collection.

LOCALITIES. South Africa, Transvaal: [Gauteng]: Johannesburg (3), Pretoria (19), Magaliesberg (4), Rooiplaat (1), Renosterpoort, Bronkhorstspruit District (5), Cullinan (1). [North-West]: Rustenburg (4), Hekpoort (1), Hartebeespoort Dam, Brits District (1).

Gloster Game Farm (1). [Northern Province]: Rooiberg (2), Elandshoek (1), Ofcolaco (5), Woodbush (1), Woodbush Village (1), Doornhoek Farm (1), Nylsvley/Naboomspruit (2), Malati Park (2), Pienaars Poort (1), Mariepskop (1), Mahuba's Kloof (1). [Mpumalanga]: Waterval Boven (6), Waterval Onder (3), Malelane (1), Nelspruit (4), Kalkoenkrans (1), Nelshoogte Forestry Station (1), Barberton (5), Crocodile Poort (1), Klipfontein (1). **KwaZulu-Natal:** New Hanover (4), Cato Ridge (1), Balgowan (1), Creighton Distr., Hlabeni mist forest (2), Yellowwoods, Balgowan (3), Winklespruit (1), Umkomaas (3), Mbona (1), Mkuze (2), N'Kandhla (2), Pietermaritzburg (1), Ravensworth (1), Illovo Beach (5), Impetjeni Forest (1), Durban (6), Pinetown (1), Nkwaleni (1), Karkloof (5), Sarnia (1), Kloof (1), Ladysmith (1), Toleni (1), Dukuduku Forest (1), Umdoni Park (5), M'fongosi (3), Albert Falls (1). **Cape Province:** [Western Cape]: Cape Town (1), Saasveld (1), Knysna, Garden of Eden (3), Harkerville (2), Swellendam (3), Stormsrivier (1), Storms River Bridge (1). [Northern Cape]: Grootfontein, Middelburg District (1). [Eastern Cape]: Tsitsikama, Goesabos Forestry (3), Port Elizabeth (6), East London (2), Hogsback (2), Stutterheim (1), Baviaanskloof, Geelhout Bosch (1), Buffalo Pass (2), Cambridge (1), Blaauwkrantzpass on Garden Route (1), Grass Ridge (1), Port St. John's (7), Umtata (21), The Haven (1), Langeni Forest (1), (W. Pondoland), Ngqeleni (1). **Zimbabwe:** Victoria Falls Camp (2), Van Niekerk Hotel nr. Gwaai Bridge (1), Christon Bank (2), Harare (Salisbury) (14), Victoria District (2), Bulawayo (1), Lowdale (2), Mazoe (1), Mutare (Umtali) (1), Murahwa's Hill (2), Inyanga (1), Vumba (12), Insuza River (2), 10m E. Sawmills (1), Macheke (1), Wingate (1), Darwendale (1), Gazi Forest (1), Popotekwe Bridge (1). **Botswana:** N'Kate, Makarikari (1). **Moçambique:** Dombe (1), Chiluwo Hills (1), Angustino Farm, Revue Station (1). **Angola:** Chingue, 1400 m (1), Busaco, 1000 m (1). **Malawi:** Nyassaland, no further data (1), Bvumbwe (1). **Zambia:** Ndola (2), Cningola (1), Chiwefwe (4). **Kenya:** W., Njoro, Budonga (2), Shimba Hills, Coast (2), Kitale (1), Nairobi (1). **Tanzania:** no further data (1), Lindi, Ndanda, 300 m (1), Marungu, 1500 m (1), Mikindani (1), Morogoro (1). **Uganda:** Abera Forest, Gulu (1). **Zaire:** Kolwezi, Katanga (1). **Cameroon:** interior, Garua (1), Duma (1). **Nigeria:** S., Kaduna (3), S., Mokwa (1). **Upper Volta:** Bobo (1). **Sierra Leone:** no further data (1). **Yemen:** N., Djebel Masanah, ± 70 km K.O. Sanaa, 30–3300 m (1). **French Sudan:** Koulouba (1). **Ethiopia:** Choa, Debré Zeit, 1800 m (1).

The species has further been recorded from the Congo Republic, Malawi, Cameroon, Senegal, and Rwanda (specimens in Herbule collection).

### 82a. *Chiasmia steniiata arata* (Saalmüller, 1891) comb. n.

not illustrated

*Macaria arata* Saalmüller, 1891: 497. Type(s): **Madagascar:** Nossi-Bé (not traced in SMF) [not examined].

*Macaria albogrisearia* Mabille, 1900: 736. Holotype ♀, **Madagascar:** Type; Madagascar, J. Decorse 1899, Muséum Paris; *M. albogrisearia* Mab.; Meretanana, 14.7.[18]99, après [followed by two undecipherable words]; *Macaria steniiata arata* Saalmüller 1891, det[erminavit] D.S. Fletcher 1951/4.; *Macaria albogrisearia* Mabille Ann. Soc. Ent. Fr. 1899, p. 736 (MNHN) [examined].

*Gonodela* [sic] *flavipicta* Bastelberger, 1907: 167 (168?). Holotype ♂, **Madagascar:** Tamatave; Nr. 18; T.; Warr[en] det.; Coll. Bastelberger; Holotypus/ Lep. 447 [obliterated] 2682 *flavipicta*; Un synonyme de *Macaria arata* Saalm. 1891; *Semiothisa steniiata arata* (Saalm. 1891) (= *albogrisearia* P. Mabille, 1900, = *flavipicta* Bastelberger 1900) (SMF) [examined].

*Macaria arata* Saalmüller; Janse, 1932: 229 (synonymy); Herbule, 1956: 248; Fletcher, 1958a: 137 (as synonym of *steniiata arata*).

*Semiothisa steniiata arata* (Saalmüller); Herbule, 1956: 248.

*Semiothisa flavipicta* (Bastelberger); Herbule, 1956: 248 (as good species).

*Macaria albogrisearia* Mabille; Herbule, 1956: 248 (synonymy); Fletcher, 1958a: 137 (as synonym of *steniiata arata*).

*Gonodela* [sic] *flavipicta* Bastelberger; Fletcher, 1958a: 137 (synonymy); Viette, 1973: 152 (synonymy of *arata*, which is treated as a good species).

**DIAGNOSIS.** Adult. The Madagascan subspecies is generally smaller, with a fore wing length of 13–15 mm. The postmedian line is frequently double brown-and-yellow.

**DISTRIBUTION.** Madagascar.

**MATERIAL.** 11♂ and 5♀. 11 Paris (MNHN), 4 C. Herbule collection, 1 Pretoria (TM).

**LOCALITIES.** **Madagascar:** no further data (1), S., Lambomakondro Forest (2), N., Haut Sambirano road 10 km from Ambanja, Col du Bekaka, 140 m (1), W., new Abondromamy-Port Bergé Vaovao road at km 122, Sarodrano Forest, 140 m (5), Ampijorora, 170 m, Ankarafantsika (1), SW., Ankalirano, Mahafaly plateau (3), Péritet, Anamalazaotra (1), S., Fianarantsoa (1), Parc de Tsimbazaza/Antananarivo (1).

### 83. *Chiasmia herbulei* (Viette, 1973) comb. n.

Figs 323, 324; 664, 888

*Semiothisa herbulei* Viette, 1973: 153. Holotype ♂,

**Madagascar:** Holotype; Madagascar Est, env[irons] de Perinet, alt[itude] 910 m, forêt d'Anamalazoatra, P. Viette le 24.xi.1954; *Semiothisa herbuloti* n.sp. ♂ Holotype, P.E.L. Viette det. 1972 (MNHN) [examined].

FORE WING LENGTH. 14–15 mm (♂), 14 mm (♀).

ADULT (Figs 323, 324). Medium-sized; rather dark in appearance, tail on hind wing not pronounced. Ground colour of wings ochreous white, profusely dusted with grey. Postmedian area somewhat darker. Basal and median lines faint; postmedian line well developed, double, acutely angled below costa of fore wing. Preapical spot brown. Postmedian area of fore and hind wings with a black spot, larger on hind wing. Discal spots well developed though sometimes small on fore wing, dark. Underside white, thickly and irregularly dusted with grey in basal and median area; discal spots and median line prominent. Postmedian area brown mixed with orange, whitish to yellowish blotches present along termen. Vestiture of thorax and body grey. Hind tibia of ♂ not modified. Setal comb on A3 absent.

MALE GENITALIA (Fig. 664). Uncus horns well developed; gnathos with medial element not much wider than arms. Costa of valve slightly recurved. Valvula developed as a small elliptical sclerotization. Sacculus large, with distal margin forming a blunt, ascending process. Aedeagus stout and cylindrical, apex forming a distinct tip. Vesica with a large, rhombic median cornutus and exhibiting a granulose patch near centre. Octavals w-shaped, rather shallow.

FEMALE GENITALIA (Fig. 888). Elongated. Papillae anales small. Apophyses delicate, a. anteriores about one third length of a. posteriores. Antrum very large, contour trapezoidal. Bursa copulatrix resembling a long, wide tube. Ductus bursae ribbed posteriorly and exhibiting a large sclerotized area; corpus bursae membranous. Signum absent.

DIAGNOSIS. Although the genitalia of *Chiasmiella herbuloti* are similar to those of 86. *C. tetragraphicata*, below, and 82. *C. steniata*, above, the moth is rather different in facies from either species. The sombre upperside with a strongly developed postmedian line and the blackish spots in the postmedian area are typical. Genitalic structure as illustrated.

BIOLOGY. Adults have been collected in October–December and February–March.

DISTRIBUTION. Madagascar.

MATERIAL. 26♂ (2 dissected, Geometridae genitalia slides No. 16109, 16942) (BMNH)) and 5♀ (1 dissected, Geometridae genitalia slide No. 16110) (BMNH). 22 London (BMNH), 8 Paris (MNHN).

LOCALITIES. **Madagascar:** Perinet (7), Station

Perinet, 149 km E. Tananarivo (15), Anamalazaotra Forest/Périnet, 910 m (3), Res. nat. III, Ambatovositra, Andranomalaza (2), Andranotobaka, 1400 m, Ambatolampy (2), E., Lakato road at km 10, Ambodiriana, 1050 m (1), Diego Suarez (1).

#### 84. *Chiasmia hypactinia* (Prout, 1916) comb. n.

Figs 325, 326; 665, 889

*Macaria hypactinia* Prout, 1916c: 283. Holotype ♀, **Madagascar:** Tananarive, Collection Le Moulit; Collection Chulliat; Nov[itates] Zool[ogicae] XXIII.283; *Macaria hypactinia* Prout ♀type; Type; Geometridae genitalia slide No. 2505 (BMNH) [examined].

*Semiothisa bupalaria* Herbulet, 1954a: 123. Holotype ♂, **Madagascar:** Type; Madagascar Centr[al], Massif de l'Ankaratra, Manjakatompo; Forêt d'Ambahona, Alt[itude] 1850 m, P. Viette, Chasse No. 62 du 28.xi.1951; Muséum Paris, Mission P. Viette, Sept[embre] 1951–Mars 1952; *Sem. bupalaria* Holotype [handwritten]; [genitalia slide No.] 1991; *Semiothisa bupalaria* Hrblt., Mém. Inst. Sc. Mad., E, 5, 1954, p. 123 (MNHN) [examined].

**Syn. n.** Paratypes (5♀). **[Madagascar]:** Forêt d'Ambahona, Alt[itude] 1850 m (P. Viette), chasse No. 63 du 29.11.1951; Madagascar Centr[al], Massif de l'Ankaratra, Manjakatompo; Paratype; *Semiothisa bupalaria* Hrblt.; Geometridae genitalia slide No. 2506; Brit. Mus. 1955–78 (BMNH, MNHN) [examined].

*Semiothisa bupalaria* Herbulet; Herbulet, 1956: 248; 1972: 144.

*Semiothisa hypactinia* (Prout); Herbulet, 1956: 248.

FORE WING LENGTH. 13–16 mm (both sexes) (f. *hypactinia*), 16–18 mm (both sexes) (f. *bupalaria*).

ADULT (Figs 325, 326). Large. Termen of hind wing finely crenulated. Wings glossy. Ground colour off-white, suffused with ochreous-grey; suffusion more intense in postmedian area. Basal line faint and developed on fore wing only; median irregular, more like a fascia and also faint on hind wing. Postmedian well developed, acutely angled below costa of fore wing, but again faint on hind wing. Discal apots present but small. Fore wing with a whitish apical streak. A row of small whitish dots present parallel to termen in postmedian area of hind wing. Ciliae on both wings conspicuously chequered grey-and-white. Underside whitish, very extensively suffused with dark olivaceous brown. Some veins, particularly R on hind wing, marked with white. Whitish apical streak of fore wing and row of whitish dots on hind wing as on upperside. Vestiture of body concolorous with wings, darker on underside. Hind tibia of ♂ not modified. Setal comb on A3 absent. *Variation.* Markedly larger specimens are found at high

altitudes; these examples are referable to f. alt. *bupalaria* (Herbulot).

**MALE GENITALIA** (Fig. 665). Uncus horns small; gnathos with prominent medial element. Costa of valve slightly recurved, not dilated apically and without ventral process. Sacculus broadly triangular, pointed, and with a circular interior structure. Aedeagus elongated, approximately cylindrical; apical region well sclerotized dorsally. Vesica bearing a single, large, rhombic median cornutus. Octavals arcuate and rather shallow, well sclerotized.

**FEMALE GENITALIA** (Fig. 889). Papillae anales normally developed. Apophyses posteriores delicate, a. anteriores much stouter, about two-thirds length of former. Sterigma not particularly modified. Antrum broadly funnel-shaped and very conspicuous. Bursa copulatrix resembling a short and wide, posteriorly ribbed tube. Signum absent.

**DIAGNOSIS.** A quite unmistakable species. The contrast between the pale upperside and the sooty brown underside is most striking.

**BIOLOGY.** *Chiasmia hypactinia* is mountainous and occurs in a distinctly larger altitude form above 2000 m. Adults have been collected in October–November at altitudes of 1100–2500 m.

**DISTRIBUTION.** Madagascar, with most records from the central parts.

**MATERIAL.** 46♂ (1 dissected, Geometridae genitalia slide No. 2507) (BMNH) and 37♀ (1 dissected, Geometridae genitalia slide No. 2508) (BMNH). 2 London (BMNH), 81 Paris (MNHN).

**LOCALITIES.** f. *hypactinia*: **Madagascar:** Périnet (1), Station Perinet (1), Analamazaotra Forest/Périnet, 910 m (1), E., Ankasoka, 1130 m (1), E., Lakato road at km 15, Ankasoba, 1100 m (2), Reserve nat. III, Ambatovositra, Andranomalaza (12), E., Res. nat. III, E. env. of Nosivola, 1000 m (1), Moramenga (1), Makatringo (1), C., Ankazobe, Fort Ambohitantely (1), Anjozorobe (2), C., Angavokely Forestry Station, Angavobe, 1700 m (9) [transitional to f. *bupalaria*], C., La Mandraka, 1250 m, Manjakandriana (3).

f. *bupalaria*: C., Andringitra, central Andohariana plateau (Soaindrana), 2030 m (28), C., E. Andringitra, E. of Antsifotra River, Agauria formation, 2000 m (6), C., central Andringitra, around Boby, 2500 m (1), C., southern Andringitra, Andrianony Chain, around Manjarivo, 1650 m (3) [transitional to f. *hypactinia*], C., Ankaratra Massive, au dessous du piton de l'Ambohimandrana, 2250 m (9).

## 85. *Chiasmia tsaratanana* (Viette, 1980) comb. n.

Figs 327, 328; 666

*Semiothisa tsaratanana* Viette, 1980: 34. Holotype ♂.

**Madagascar:** Holotype; Madagascar nord, massif du Tsaratanana, piste de Mangindrano au Maromokotra, au N. du piton coté 2362 m, 9.–12.xi.1966, 2310 m; mission au Tsaratanana xi/1966, Camp no. 2 (P. Griveaud, P. Saga, P. Viette et D. Wintrebret); *Semiothisa tsaratanana* n.sp. ♂ Holotype, P.E.L. Viette det. 1978; genitalia slide M. Krüger No. 5 (MNHN) [examined].

**FORE WING LENGTH.** 16–18 mm (♂).

**ADULT ♂** (Figs 327, 328). Large. Apex of fore wing pointed; termen of hind wing with a very small tail. Ground colour of wings cream white, densely suffused with ochreous grey, more intensely so in postmedian areas. Basal and median lines blackish, incomplete. Postmedian very well developed, blackish and acutely angled below costa of fore wing. Discal spots distinct, blackish. A whitish dot present near apex of fore wing. A number of irregularly distributed blackish maculae distal of postmedian line. Underside whitish mixed with orange, densely suffused with ferruginous brown. Lines and discal spots appearing indistinct. A white dot present near apex of fore wing. Vestiture of thorax and abdomen ochreous grey on upperside, ferruginous brown on underside. Hind tibia of ♂ not modified. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 666). Uncus horns small compared with size of genitalia; gnathos normally developed. Costa of valve gently recurved and somewhat dilated apically; ventral process absent. The triangular sacculus prominent; tip extended to form a bluntly pointed process. Aedeagus rather large and pointed; vesica bearing a rhombic median cornutus and exhibiting a granulose subapical area. Octavals broadly furcate, with rounded tips.

**DIAGNOSIS.** Similar to 77. *C. subvaria*, above, but colour greyish rather than brown and with conspicuous dark maculae bordering postmedian line distally. The two species are strictly allopatric, *C. tsaratanana* being restricted to Madagascar. The differences in male genitalic structure are evident from the illustrations (compare Figs 658, 666).

**BIOLOGY.** A mountainous species with a very limited range. Adults have been collected in November–December.

**DISTRIBUTION.** Northern Madagascar, only recorded from Tsaratanana massive at altitudes between 1900 and 2100 m.

**MATERIAL.** 8♂. 8 Paris (MNHN).

**LOCALITIES.** **Madagascar:** N., Tsaratanana Massive, facing west, 2400 m, Andilambe (5), *ibidem*, facing south, 2030 m, Andohanambatoafa (2), N.,

Tsaratanana Massive, en dessus de l' Andohanisambirano Matsabory, 1900 m (1).

**86. *Chiasmia tetraphraphicata* (Saalmüller, 1880) comb. n.**

Figs 329, 330; 667, 890

*Hemerophila tetraphraphicata* Saalmüller, 1880: 294.

LECTOTYPE ♂, here designated, **Madagascar**:

Madag[ascar], Loucoubé (Stumpff [18]80); *Macaria tetraphraphicata* m[ea], Snell, 61, 274; Typus/Lep. 444 [obliterated] 2720 *tetraphraphicata* [abdomen missing] (SMF) [examined]. Paralectotype (1♂).

**Madagascar**: *ibidem*, dated 1882; Paratypoid/Lep. 444 [obliterated] 2720a (SMF) [examined].

*Macaria balteata* Saalmüller, 1891: 497. LECTOTYPE

♀, here designated, **Madagascar**: *Macaria* n.5, Sn. 80, *Aenistis albicaria* [?, obliterated]; Typus/Lep.

445 [obliterated] 2667 (SMF) [examined].

Paralectotypes (3♀). **[Madagascar]**: no further data; labelled 'Paratypoid/Lep. 445a-c [obliterated] 2667 a-c (SMF) [examined].

*Macaria tetraphraphicata* (Saalmüller); Saalmüller, 1891: 497.

*Macaria balteata* Saalmüller; Herbolut, 1956: 249 (synonymy).

FORE WING LENGTH. 14–15 mm (both sexes).

ADULT (Figs 329, 330). Sexually dimorphic. The darker, more heavily marked ♀ was originally described by Saalmüller as *Macaria balteata*. Fore wings acutely pointed, termen slightly emarginate below apex. Hind wing with a well developed tail. Ground colour of wings ochreous with some darker dusting, particularly near base and along costa. Postmedian area with olivaceous suffusion. All three lines developed but basal and median faint; the double blackish postmedian prominent. Discal spots present but inconspicuous. ♂ with a large, round, black spot near anal angle of hind wing. Underside characteristic: basal and median area whitish with dense dark dusting, lines and discal spots present. Postmedian area nearly wholly suffused with blackish brown, thus providing a stark contrast. Vestiture of thorax and abdomen ochreous, mixed with some dark scales. Hind tibia of ♂ not modified. Setal comb on A3 absent.

MALE GENITALIA (Fig. 667). Uncus horns prominent; gnathos normally developed. Valves massive; costa straight and not dilated apically, without ventral process. Sacculus rounded, forming short, curved process. Aedeagus large, roughly cylindrical; vesica with one large, rhombic median cornutus; tip of vesica striated. Octavals broadly w-shaped, shallow.

FEMALE GENITALIA (Fig. 890). Strongly elongated.

Papillae anales normal. Both pairs of apophyses thin, a. anteriores more than two-thirds length of a. posteriores. Antrum large, distal margin semicircular. Bursa copulatrix taking the shape of a long, wide, posteriorly ribbed tube; ductus bursae widest posteriorly, then gradually tapering. Signum absent.

DIAGNOSIS. While generally similar to many species of the *C. simplicilinea*-group, as well as *C. steniata* and its relatives, this species is readily recognized by its double postmedian line on almost pure ochreous background and its contrasting underside markings. In *C. herboluti*, above, with which it occurs on Madagascar, the dusting of the fore wing upperside is much heavier (compare Figs 323 and 329).

BIOLOGY. The species is rare in collections. Adults have been collected in August and November.

DISTRIBUTION. Madagascar, occurring mostly in northern and western parts.

MATERIAL. 2♂ (1 dissected, Geometridae genitalia slide No. 16107) (BMNH) and 4♀ (1 dissected, Geometridae genitalia slide No. 16108) (BMNH), 2 London (BMNH), 3 Paris (MNHN), 1 C. Herbolut collection.

LOCALITIES. **Madagascar**: no further data (2), N., Nossi-Bé, 150 m, Lokobé Forest (3), Sambirano, W. of Manongarivo, Rte. nat. 6, 50 km S. of Ambanja, 650 m (1).

**87. *Chiasmia angolaria* (Snellen, 1872) comb. n.**

Figs 331, 332; 668, 891

*Macaria angolaria* Snellen, 1872: 81. Holotype ♂, [Zaire]: Holotype; Africa, Banana (v. Woord.) ♂; *Macaria angolaria* Snellen Holotype; genitalia slide M. Krüger No. 1 (NNML) [examined]. The genitalia of the holotype are atrophied.

*Macaria angolaria* Snellen; Snellen, 1882: 233; Swinhoe, 1904: 505 (as good species); Fletcher, 1958a: 136 (as synonym of *steniata*).

*Semiothisa angolaria* (Snellen); Möschler, 1887: 93.

FORE WING LENGTH. 13–14 mm (♂), 14 mm (♀).

ADULT (Figs 331, 332). Ground colour of wings whitish, suffused with greyish-brown, particularly along costa and in postmedian area. All lines strongly developed, dark brown; median especially prominent. Postmedian line angled at about 80° below costa of fore wing. Discal spots present but not conspicuous. Postmedian area of both wings markedly darker, variegated with dark brown; apex with a whitish-grey blotch. ♀ appearing somewhat darker due to heavier dusting. Underside whitish with irregular brown striation and

faint orange suffusion; median line quite bold; postmedian area more or less wholly brown, with lighter patches along termen. Thorax and abdomen grey. Hind tibia of ♂ not modified. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 668). Uncus horns and gnathos normally developed. Valves massive. Costa robust, recurved, without process; sacculus broadly triangular with rounded apex. Aedeagus short and stout, fusiform; vesica without cornuti, exhibiting a striated area below apex. Octavals furcate, tips terminating in conspicuous 'knobs'.

**FEMALE GENITALIA** (Fig. 891). Papillae anales elliptical, fairly narrow. Apophyses relatively stout, a. anteriores rather more than two-thirds length of a. posteriores. Sterigma: l. antevaginalis forming a massive, somewhat angular shield; l. postvaginalis as in figure. Antrum conspicuous, pentagonal. Bursa copulatrix taking the shape of a broad, gradually narrowing and posteriorly ribbed tube. Anterior part membranous. Signum absent.

**DIAGNOSIS.** The species is unmistakable with its dark, heavy lines, contrasting strongly with the pale ground colour. The structure of the male genitalia suggests that it is closely related to 82. *C. steniata*, above (compare Figs 663 and 668).

**BIOLOGY.** *Chiasmia angolaria* is probably associated with tropical forest near the coast; three of the known specimens were collected in April and June.

**DISTRIBUTION.** Westernmost Zaire.

**MATERIAL.** 2♂ (dissected, genitalia slide No. 587 (SMF), genitalia slide M. Krüger No. 24 (MNHN)) and 1♀ (dissected, genitalia slide M. Krüger No. 25 (MNHN)). 1 Frankfurt (SMF), 2 Paris (MNHN).

**LOCALITIES.** [Zaire]: West-Afrika, Congo, Banana (1), (Congo Belge), Matadi (2).

### 88. *Chiasmia parasteniata* sp. n.

Figs 333–336; 669

**TYPE MATERIAL.** Holotype ♂, [Tanzania]: Tanganjika, Chulwe, Apr[il] 1966 (J. Kielland); 20.7. [19]66, Chulwe [handwritten]; genitalia slide M. Krüger No. 11 (NMKE) (ochreous form). See Remarks. Paratype (1♂). [Kenya]: 16.3. [19]48, Kaptagat, Walter [legit]; genitalia slide M. Krüger No. 21 (NMKE) (grey form).

**FORE WING LENGTH.** 17–18 mm (♂).

**ADULT ♂** (Figs 333–336). Large. This species displays the same variation as its close relative *C. steniata*, with a somewhat ochreous, strongly marked form and a grey, weakly marked form, corresponding to f. *amandata* (Walker) of *steniata*. **Ochreous form:**

ground colour of wings cream white with irregular brown striations; postmedian area in addition unevenly suffused with grey-brown and carrying a conspicuous, dark, round spot near cell. Basal and median line ochreous, faint and rather indistinct; postmedian well defined, angled at about 90° below costa of fore wing. Preapical spot present but not conspicuous. Discal spots normally developed. Underside whitish with orange-brown striations; discal spots and lines similar to upperside. Postmedian area with a broad orange-brown fascia and lighter blotches along termen. **Grey form:** ground colour of wings whitish, suffused with pale grey in basal and median, and with darker grey in postmedian area. Basal and medina line virtually absent. Postmedian also very faint but complete. Preapical spot faint. Discal spots very small. Underside whitish with pale orange suffusion and dense brown striation. Discal spots and postmedian line as on upperside. Postmedian area with an ill-defined dark brown fascia running along centre. Thorax and abdomen concolorous with wings, grey and ochreous-grey, respectively. Hind tibia of ♂ not modified. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 669). Uncus horns and gnathos well developed. Costa of valve straight, slightly dilated apically and without ventral process. Sacculus large, triangular and well rounded. Aedeagus short and stout, fusiform; vesica exhibiting a fairly large granulose area near tip. Octavals furcate, with rounded tips.

**DIAGNOSIS.** Very similar to 82. *C. steniata*, above; for reliable identification, dissection of the genitalia is necessary. Here, *C. parasteniata* is characterized by the shorter and blunter sacculus of the valve and the markedly narrower octavals (compare Figs 663 and 669).

**BIOLOGY.** The two known specimens were collected in March and July, respectively.

**DISTRIBUTION.** Tanzania and Kenya.

**ETYMOLOGY.** From Greek παρά, close by, and *C. steniata*, above, referring to the close relationship between the species.

**REMARKS.** The two labels on the holotype are conflicting as to the date of capture. It is here assumed that the second one, presumably handwritten by the collector, is correct.

### 89. *Chiasmia buettikeri* (Wiltshire, 1980) comb. n.

Figs 337, 338; 670, 892

*Semiothisa buettikeri* Wiltshire, 1980: 198. Holotype ♂, [Saudi Arabia]: Village Qaraah, Khamis M[ushayt], 2000 m, 16.IV.1976; XII 1976/Preparation WBL.15; *Semiothisa buettikeri* Wilts. ♂

holotype (NMB) [examined]. Paratypes (4♂, 2♀). Examined: 2♀. **Saudi Arabia:** 1♀, Al Alayyah, 1950 m, 8.–10.10.; Saudi Arabia (W. Büttiker) 1979; 1♀, An Nimas, 18.4.1979 (A.S. Talhouk) (NMB, BMNH) [examined].

FORE WING LENGTH. 16–17 mm (♂), 12–16 mm (♀).

ADULT (Figs 337, 338). Antennae ciliate in both sexes, flagellum stronger in ♂. Termen of hind wing with trace of a tail. Ground colour of wings cream white, densely irrorated with mouse grey; postmedian area suffused with darker grey. Basal and median lines greatly reduced, their position marked by dark maculae on costa of fore wing. Postmedian prominently developed, bordered by blackish scales and strongly curved below costa of fore wing. Preapical spot conspicuous, brown, bordered with black. Discal spots conspicuous, larger on fore wing. Underside grey with coarse darker irroration; postmedian area suffused with dark greyish-brown. A whitish blotch present near apex of fore wing. Discal spots developed. Body and abdomen grey. Hind tibia of ♂ not modified. Setal comb on A3 absent.

MALE GENITALIA (Fig. 670). Tegumen elongated. Uncus horns of medium size; gnathos normally developed. Costa of valve gently curved and somewhat dilated apically, without ventral process. Sacculus strikingly modified: upper part forming a long, twisted process. Aedeagus strongly elongated, slightly curved; vesica with a large, elliptical median cornutus and a second, smaller subapical cornutus. Octavals broadly w-shaped, tips curved outwards.

FEMALE GENITALIA (Fig. 892). Papillae anales small and delicate. Both pairs of apophyses very thin; a. anteriores approximately two-thirds length of a. posteriores. Sterigma: l. antevaginalis crescentic, l. postvaginalis forming two round sclerotizations on either side of ostium. Bursa copulatrix stout and tubular, with massively developed antrum. Corpus bursae with leathery texture, ribbed throughout except for anteriormost section. Signum absent.

DIAGNOSIS. A very conspicuous and beautifully marked species, approaching in habitus some of the larger members of the *C. semitecta*-group.

BIOLOGY. Adults have been collected in April, August and October.

DISTRIBUTION. Endemic to Saudi Arabia, where it occurs at altitudes of approximately 2000–2400 m (Wiltshire, 1980).

MATERIAL. 4♂ (1 dissected, NMB genitalia slide No. 1) and 3♀ (1 dissected, NMB genitalia slide No. 2) (NMB). 4 London (BMNH), 2 Basel (NMB), 1 C. Herbolut collection.

LOCALITIES. **Saudi Arabia:** Namas, 2380 m (1), An Naamah, 2100 m (1). **Ethiopia:** Harar (3), Dire Daoua (1), Eritrea, Dorfu (1).

## 90. *Chiasmia collaxata* (Herbulot, 1987) comb. n.

Figs 339, 340; 671

*Semiothisa collaxata* Herbulot, 1987: 280. Holotype ♂, **Cameroon:** Mont Kala, 18 km W. de Yaoundé, 1120 m, 20.IV.1972 (C. Herbulot); Pr[éparation] No. 6427 C. Herbulot; *Semiothisa collaxata* Hrblt. Holotype (C. Herbulot collection) [examined]. Paratype (1♂). **Cameroon:** Mont Ngoakélé, 11 km WSW de Yaoundé, 1125 m, 10.XI.1976 (Ph. Darge) (C. Herbulot collection) [not examined].

FORE WING LENGTH. 15–16 mm (♂).

ADULT ♂ (Figs 339, 340). Ground colour whitish, but wings appearing predominantly sepia due to heavy dusting; median area with a lighter fascia. All lines well developed, but dark and thus inconspicuous. Postmedian area of both wings with a conspicuous dark blotch. Underside whitish (yellowish along costa), with dark brown striations in basal and median areas; discal spots and median line very heavy. Postmedian area wholly suffused with dark brown except for whitish blotch near anal angle. Vestiture of thorax and abdomen sepia on upper, and yellowish-white on underside. Hind tibia of ♂ dilated. Setal comb on A3 absent.

MALE GENITALIA (Fig. 671). Uncus horns and gnathos well developed. Costa of valve slightly recurved, tapering strongly and bearing a small ventral process. Sacculus rounded, with a sagging appearance; termen extended to form a large, curved process. Aedeagus massive and somewhat spindle-shaped, well sclerotized in anterior half; a small dorsoapical serration also present. Vesica bearing a single, fairly short median cornutus and exhibiting a group of microcornuti near apex. Octavals broadly furcate.

DIAGNOSIS. Similar to *C. ostentosaria*, *impar* and *albivia*, but separated from them by the absence of a large spur or at least prominent process formed by the sacculus. Also, in general appearance the coloration of *C. collaxata* is more chocolate brown.

BIOLOGY. The very few specimens known were collected in April and September, respectively, those from Cameroon at an altitude of 1120–1125 m. Apparently a rare species confined to tropical forests.

DISTRIBUTION. West to East Africa (Cameroon, Zaire and Uganda).

MATERIAL. 2♂ (1 dissected, genitalia slide M. Krüger No. 8) (MRAC). 1 London (BMNH), 1 Tervuren (MRAC).

LOCALITIES. [Zaire]: (Congo), Lowa (1). Uganda: Entebbe (1).

**91. *Chiasmia ostentosaria* (Möschler, 1887)  
comb. n.**

Figs 341–343; 672, 893

*Semiothlisa ostentosaria* Möschler, 1887: 94. Holotype ♂, [Ghana]: Gold Coast, Aburi (not located) [not examined]. The identity of the species was established from Möschler's description. *Gonodela* [sic] *siennata* Warren, 1900: 95. Holotype ♂, [Nigeria]: Warri, V.[18]98 (Dr Roth); VII.95/*Gonodela* [sic] *siennata* Warr. Type ♂ (BMNH) [examined].

*Semiothlisa ostentosaria* Möschler; Herbulot, 1954b: 324.

*Semiothlisa siennata* (Warren); Swinhoe, 1904: 505 (as good species); Herbulot, 1954b: 324 (synonymy).

FORE WING LENGTH. 17 mm (♂), 18 mm (♀).

ADULT (Figs 341–343). Large. Fore wings narrow, particularly in ♂, tail on hind wings moderately well developed. Ground colour of wings cream white, thickly dusted with grey, especially in postmedian area; in addition darker grey striae present. ♀ lighter than ♂. Basal line present only on fore wing, median line developed on both wings but like basal line usually inconspicuous. On the outside of the well-developed, double, dark brown postmedian line a characteristic pale orange fascia with long, dark striae. Discal spots grey. Some dark marks in postmedian area of both wings. Underside cream white to white with irregular medium to dark brown irroration. Discal spots and median line well developed, the latter more like a fascia. Postmedian area uniformly brown with exception of some whitish blotches along termen. Vestiture of thorax and abdomen grey with faint darker irroration. Hind tibia of ♂ dilated. Setal comb on A3 present.

MALE GENITALIA (Fig. 672). Uncus horns well developed; gnathos fairly delicate. Costa of valve massive, very slightly curved and lacking process; valvula large, triangular; sacculus forming a very conspicuous, long, angled process. Aedeagus long and slender, slightly spindle-shaped; vesica with a small, club-shaped cornutus near tip behind which is situated a small area of denser sclerotization. Octavals broadly w-shaped.

FEMALE GENITALIA (Fig. 893). Papillae anales medium-sized. Apophyses fairly delicate, a. anteriores about two-thirds length of a. posteriores. Sterigma: lamella antevaginalis a broad shield without further modifications; lamella postvaginalis forming a crescentic sclerotization across the well developed antrum. Bursa copulatrix large, pear-shaped. Signum very large, almost circular.

DIAGNOSIS. Confusion is possible with *C. impar* and *albivia*, below, and also with 57. *C. feraliata*. *C. ostentosaria* is characterized by the presence of a pale orange fascia with dark striation distal to the postmedian line which is absent in all of the other species. In the male, the length of the spur-like process on the distal margin of the sacculus allows for ready separation of *ostentosaria*, where it is longest, *impar*, where it is of intermediate length, and *albivia*, where it is very short (compare Figs 672, 673 and 676). In the female genitalia, there is only some similarity between *C. ostentosaria* and *impar*; however, there are clear differences in the sterigma and the bursa copulatrix is shorter and more pear-shaped in *ostentosaria* (compare Figs 893 and 894).

BIOLOGY. Apparently an inhabitant of the tropical lowland forests of west Africa. Adults have been collected in December–January, March–May and September–October.

DISTRIBUTION. West, Central and East Africa, with records from Liberia, Nigeria, Ghana, Sierra Leone, Togo, Cameroon, Ivory Coast, and Angola; Zaire and Congo Republic; and Uganda and Kenya.

MATERIAL. 24♂ (1 dissected, Geometridae genitalia slide No. 16131) (BMNH) and 13♀ (1 dissected, Geometridae genitalia slide No. 16132) (BMNH), 15 London (BMNH), 6 Paris (MNHN), 2 Berlin (ZMHB), 1 Munich (ZSBS), 7 Nairobi (NMKE), 6 C. Herbulot collection.

LOCALITIES. **Uganda:** Kibale Forest, Toro (1); Kayonza, Kigezi (3); Fort Portal, Toro (1). **Kenya:** Kaimosi (1). **Sierra Leone:** Moyamba (1). **Ivory Coast:** Bingerville (1). **Togo:** Bismarckburg (1), no further data (1). **Cameroon:** (N. Kamerun), Johann-Albrechts-Höhe (4). **Nigeria:** S., Ilesha (1). **Angola:** NW., North Cuanza Province, Canzele, 30 km N Quicolungo (1), Quirimbo, 75 km E. P. Amboim (3). **Zaire:** Sankuru, Katako-Kombe (1), Matadi (6). **Liberia:** Grassfield, Nimba (2). **French Cameroons:** Yabassi Distr. (1). **[Ghana]:** Kumasi (2). **[Span. Guinea]:** Benitogebiet (1). **Gabon:** Mouila (3). **Republic of Congo:** 5–6 km SW. Ouedo (3).

**92. *Chiasmia impar* (Warren, 1897) comb. n.**

Figs 344–346; 673, 894

*Gonodela* [sic] *impar* Warren, 1897a: 107. LECTOTYPE ♂, here designated, [Nigeria]: (Niger C.P.), Warri, Feb[ruary] [18]96 (Dr. Roth); IV.107/*Gonodela* [sic] *impar* Warr. ♂ type; Rothschild Bequest B.M. 1939–1 (BMNH) [examined]. Paralectotype (1♀). **[Nigeria]:** *ibidem*, dated June [18]96 (BMNH) [examined].

*Semiothisa impar* (Warren); Swinhoe, 1904: 506; Herbulot, 1954b: 325.

*Macaria laguaria* Prout, 1917a: 126. Holotype ♀, Ivory Coast: Côte d'Ivoire; Joicey Bequest Brit. Mus. 1934–120; *Macaria laguaria* Prout ♀ type; genitalia slide No. 16929 (BMNH) [examined].

*Macaria laguaria* Prout; Herbulot, 1954b: 325 (synonymy).

FORE WING LENGTH. 16 mm (♂), 15–17 mm (♀).

ADULT (Figs 344–346). Large. Fore wings narrow in ♂, broad in ♀. ‘Tail’ on hind wing moderately pronounced. Ground colour of wings whitish, with extensive purplish-grey suffusion, leaving a paler median fascia. Lines not well developed. Postmedian relatively most pronounced, though sometimes incomplete. Preapical spot on fore wing well developed, brown. Interneural spots blackish, very prominent, particularly in ♀. Additional blackish spots present near anal angle of hind wing. Discal spots moderately conspicuous, larger on hind wing. Underside white with extensive dark brown suffusion in most of postmedian area, leaving white blotches near apex of fore wing and anal angle of hind wing. Postmedian line and discal spots well developed. Vestiture of thorax and abdomen dark grey on upperside and whitish grey on underside. Hind tibia of ♂ dilated. Setal comb on A3 present.

MALE GENITALIA (Fig. 673). Uncus horns large; gnathos well developed, with truncated medial element. Costa of valva massive, straight and without process; distal margin of sacculus forming a prominent spur-like process. Aedeagus of medium size, tapering anteriorly. Vesica with a long, blade-like median cornutus and some microcornuti near apex. Octavals broadly w-shaped, tips well rounded.

FEMALE GENITALIA (Fig. 894). Papillae anales medium-sized. Apophyses slender, a. anteriores between half and two-thirds length of a. posteriores. Sterigma: lamella postvaginalis forming two small elliptical sclerotizations of wrinkled texture near ostium. Operculum hood-shaped. Antrum very prominent, cylindrical and heavily sclerotized, joining membranous part of ductus some distance from posterior end. Bursa copulatrix large and pear-shaped. Ductus bursae densely ribbed, corpus membranous. Signum prominent, circular, with short spicula.

DIAGNOSIS. Very similar in facies to *C. grandis*, below. The differences in genitalic structure between the two species as illustrated. 95. *C. albivia* is also similar but generally paler. Confusion is further possible with *C. ostentosaria*, above; *C. impar* and *grandis* are characterized, however, by the heavy black marks across the postmedian line of the fore wing and lack the pale orange fascia bordering the postmedian line. See also the diagnosis under *C. ostentosaria*. In the ♀, large

specimens of 75. *C. genuilinea*, above, may at first appear similar but can be recognized by the presence of a conspicuous, blackish, elliptical mark near the anal angle of the hind wing.

BIOLOGY. Like *C. ostentosaria*, the species is found in the tropical forests of West Africa, but unlike that species ranges further inland. Both species are sympatric in some localities. Adults have been collected in June and September–October.

DISTRIBUTION. West and East Africa, recorded from Nigeria, Cameroon and Ivory Coast and Uganda and Tanzania, respectively. The presence of *C. impar* in East Africa requires further investigation due to possible confusion with *C. grandis*.

MATERIAL. 2♂ (dissected, Geometridae genitalia slide No. 16133) (BMNH), genitalia slide M. Krüger No. 36 (BMNH) and 13♀ (2 dissected, Geometridae genitalia slide No. 16134) (BMNH); genitalia slide M. Krüger No. 11 (C. Herbulot collection). 2 London (BMNH), 1 Paris (MNHN), 1 Bulawayo (NMBZ), 3 Nairobi (NMKE), 7 Berlin (ZMHB), 1 C. Herbulot collection.

LOCALITIES. Ivory Coast: Bingerville (1), N'Douci (1). Cameroon: Johann-Albrechts-Höhe Station (1), Manengouba Massive (1). Uganda: Bwamba Toro (2), Jinja, Mabira Forest (1), Zika Forest, Entebbe (1). Tanzania: (DOA), Lindi (3), Tendaguru/Lindi (1), Daressalam (1), Ost-Afrika (1), no further data (1).

### 93. *Chiasmia grandis* sp. n.

Figs 347, 348; 674, 895

TYPE MATERIAL. Holotype ♂, [Zaire]: Go, Uelle District, Coll. Michel; Africa, Congo Belge, Zoolog[ische] Staatssammel[ung] genitalia slide M. Krüger No. 12 (ZSBS). Paratypes (3♀). Uganda: 2♀ Bwamba Toro, Sept[ember] 1961 (N. Mitton); 1♀, Mabira Forest, Jinja, Oct[ober] 1962 (R.H. Carcasson); *albivia* Prout TS [handwritten] [misidentification]; genitalia slide M. Krüger No. 35 (NMKE) (NMKE).

FORE WING LENGTH. 17 mm (♂), 17–18 mm (♀).

ADULT (Figs 347, 348). Large. Very similar to *C. impar* on both upper and underside of wings. Interneurals prominently developed, blackish, mixed with brown in one specimen. Hind tibia of ♂ scarcely dilated, not modified. Setal comb on A3 present.

MALE GENITALIA (Fig. 674). Uncus horns large; gnathos normal. Valves massive; costa slightly recurved, lacking ventral process. Sacculus somewhat triangular, termen extended to form curved process. Aedeagus large, tapering anteriorly; vesica with a subapical and a median area of denser sclerotization but lacking true

cornuti and exhibiting a sclerotized, three-pronged tip, Octavals nearly circular.

FEMALE GENITALIA (Fig. 895). Papillae anales of medium size, elliptical. Both pairs of apophyses slender; a. posteriores not markedly longer than a. anteriores. Sterigma: l. antevaginalis large, between crescentic and rectangular in shape; l. postvaginalis forming a large, smooth, elliptical sclerotization on either side of ostium. Antrum well developed, strongly sclerotized and equaling anterior part of ductus bursae in length. Bursa copulatrix elongated and pear-shaped; signum large.

DIAGNOSIS. Similar to *C. impar*, above, on account of the prominent blackish interneurals which are probably even larger and more pointed in the present species. Reliable identification requires dissection of the genitalia. The male of *grandis* is best recognized by the sclerotized tip of the vesica and the rounded octavals (compare Figs 673 and 674). The female genitalia have, among other differences, the antrum much more slender (compare Figs 894 and 895).

BIOLOGY. Apparently a forest species. Adults have been collected in September–October.

DISTRIBUTION. Uganda and Zaire.

ETYMOLOGY. From Latin *grandis* (-e), large or spectacular; on account of the new species' striking appearance.

#### 94. *Chiasmia pernoptera* (Prout, 1915) comb. n.

Figs 349–351; 675, 896

*Macaria pernoptera* Prout, 1915a: 350. Holotype ♂, [Cameroon]: Bitye, Ja River; L.B. Prout Coll. B.M. 1939–643.; *Macaria pernoptera* Prout ♂ type; Rothschild Bequest B.M. 1939–1 (BMNH) [examined]. Paratype (1♂). [Cameroon]: same data as holotype (BMNH) [examined]. See Remarks.

FORE WING LENGTH. 15–17 mm (♂), 17 mm (♀).

ADULT (Figs 349–351). Large. Rather similar to ♂ of *C. impar*, above, but darker and lacking interneurals spots on upperside of fore wing; in their place, a round spot of brownish-orange scales present in most specimens. For a description, see under that species. ♀ lighter, dark grey rather than dark brown, with broader wings. Underside white with extensive dark brown suffusion, particularly on fore wings. Hind tibia of ♂ dilated, bearing hair-pencil. Setal comb on A3 present.

MALE GENITALIA (Fig. 675). Very closely approaching the genitalia of *C. impar* in structure, but with tips of octavals more widely separated and medial element of gnathos not truncated.

FEMALE GENITALIA (Fig. 896). Papillae anales medium-sized, pointed. Both pairs of apophyses moderately stout; a. anteriores rather short. Sterigma: lamella antevaginalis narrowly crescentic; l. postvaginalis forming two small, oval sclerotizations on sides of ostium. Antrum rather stout, cylindrical. Bursa copulatrix pear-shaped, with membranous ductus immediately widening into the large and rounded corpus. Signum large, situated near bottom.

DIAGNOSIS. Closely resembling *C. impar* and *grandis*, above, but distinguished from these species by the absence of the prominent interneurals spots and the generally more sombre coloration. In the male genitalia, *C. pernoptera* differs in having the octavals as well as the gnathos more truncated (compare Figs 673–675). The female of *C. pernoptera* is characterized by its longer ductus bursae and differently shaped antrum (compare Figs 894–896).

BIOLOGY. While the general distribution would suggest that this species inhabits forests, label data on one of the Rwandan specimens record it as having been collected in dry savanna.

DISTRIBUTION. West (Cameroon, Angola), Central (Zaire) and East Africa (Rwanda, Uganda and Tanzania).

MATERIAL. 24♂ (2 dissected, Geometridae genitalia slides No. 16129, 16130) (BMNH) and 2♀ (1 dissected, genitalia preparation No. 33 (NMKE)). 15 London (BMNH), 1 Paris (MNHN), 1 Munich (ZSBS), 2 Nairobi (NMKE), 7 C. Herbule collection.

LOCALITIES. **Cameroon:** Bitye, Ja River, 2000 ft (10), Mt. Kala, 18 km W. of Yaoundé, 900–1100 m (4), Mt. Ngoaékélé, 11 km WSW. Yaoundé, 1125 m (1). **Uganda:** Kayonza, Kigezi (2), Kampala-Ft. Portal, mile 10 (1). **Rwanda:** SW., Wincka, 2700 m (1), SE., Rusumo, 1300 m (1). **Zaire:** (Congo), Stanleyville (1), Haut Congo (1). **Angola:** Fazenda Congulu, Amboim District, 7–800 m (2). **Tanzania:** Tshopo-Lindi, Watershed NE Stanleyville, 1600 ft (1). **Not traced:** W. Africa, Bolo, Vincent Makinda, Bulu (1).

REMARKS. In the original description, Prout mentions a second, rather worn specimen from the type locality as being in the Rosenberg collection. Labels on the specimen listed above, which carries a green circular paratype label, give no indication that it originally came from that collection.

#### 95. *Chiasmia albivia* (Prout, 1915) comb. n.

Figs 352, 353; 676, 897

*Macaria albivia* Prout, 1915a: 349. Holotype ♂, [Cameroon]: Bitye, Ja River, 2000 feet, xi. 1907 –

III.1908 (dry [season]); *Macaria albivia* Prout ♂ type; Type (BMNH) [examined]. Paratypes (3♂). Examined: 1♂, [Cameroon]: *ibidem*, without collection date (BMNH). See also Remarks.  
*Semiothisa albivia* (Prout); Herbolut, 1954b: 325.

FORE WING LENGTH. 17 mm (♂), 18 mm (♀).

ADULT (Figs 352, 353). Large. Fore wings narrow, 'tail' on hind wing moderately pronounced. Ground colour off-white, but appearing medium to light grey due to dusting; ♀ and median area of both sexes slightly paler. Basal and median lines faint, especially in ♂, postmedian line well developed. Some dark marks near apex of fore wing and in postmedian area of both wings. Preapical spot brown, lined with blackish and generally inconspicuous. Underside: basal and median area of fore wing white to cream white, irregularly speckled and striated with brown, median line prominent, discal spots present; postmedian area dark chocolate brown in ♂, lighter brown in ♀, with some whitish blotches along termen. Vestiture of thorax and body ochreous grey. Hind tibia of ♂ dilated. Seta comb on A3 present.

MALE GENITALIA (Fig. 676). Uncus horns large; gnathos slender. Costa of valve short and massive, slightly recurved and without ventral process. Valvula with small elevation. Sacculus well developed, squarish, its distal margin drawn into a comparatively small, curved process. Aedeagus tapering anteriorly, acutely pointed apically. Vesica with a short median cornutus and exhibiting some apical striations. Octavals somewhat rectangular, with a small notch in centre of well sclerotized distal margin.

FEMALE GENITALIA (Fig. 897). Papillae anales normal. Apophyses slender, a. anteriores barely half length of a. posteriores. Sterigma: l. antevaginalis forming a crescentic sclerotization across ostium; l. postvaginalis not modified. Antrum massive, broadly funnel-shaped. Membranous part of ductus bursae short and ribbed. Corpus bursae rounded, membranous. Signum situated near centre of corpus, prominent.

DIAGNOSIS. Similar to 92. *C. impar*, above, but distinguished by the absence of the conspicuous dark markings along the postmedian line of fore and hind wings. The diagnostic characters in the male genitalia are described in the diagnosis to 91. *C. ostentosaria*, above. In the female, *C. albivia* is readily recognizable by broadly funnel-shaped antrum.

BIOLOGY. The species is associated with tropical forests in West and East Africa. Adults have been collected in May and October–November.

DISTRIBUTION. West and East Africa, with records from Ivory Coast, Cameroon, and Nigeria and from Uganda, respectively.

MATERIAL. 3♂ (2 dissected, Geometridae genitalia slide No. 16135 (BMNH); genitalia slide No. 16 (ZMHB) and 4♀ (1 dissected, Geometridae genitalia slide No. 16136) (BMNH). 2 London (BMNH), 1 Berlin (ZMHB), 1 Munich (ZSBS), 3 Nairobi (NMKE).

LOCALITIES. Ivory Coast: Ganyonyo (1). Cameroon: Bitje, Ja River, 2000 ft (1); Johann-Albrechts-Höhe (1). Nigeria: E., Ikom (1). Uganda: Bwamba, Toro (2), Mabira Forest, Jinja (1).

REMARKS. It appears that the three paratypes supposed to be deposited in BMNH never received the circular paratype labels used in that institution, and were not incorporated in the main collection. The paratype from Bitye listed above was located in the duplicate collection. It seems possible, therefore, that the two other specimens from Bibianaha (Ghana) and Illesha (Nigeria) mentioned by Prout may be among this material as well.

#### 96. *Chiasmia fitzgeraldi* (Carcasson, 1964) comb. n.

Figs 354, 355; 677, 898

*Semiothisa fitzgeraldi* Carcasson, 1964: 68. Holotype ♂, [Zambia]: N[orthern] Rhodesia, Abercorn, Nov[ember] 1963 (D. Vesey-FitzGerald); Brit. Mus. 1965–346; Geometridae genitalia slide No. 5657; Holotype ♂ *Semiothisa fitzgeraldi* Carcasson (BMNH) [examined]. Paratypes (3♂). [Zambia]: *ibidem*, dated XI–1963 (E.S. Brown) (1) and II–V 1954 (D. Vesey-FitzGerald) (2) (NMKE) [examined].

†*Semiothisa miracula* Prout MS.

FORE WING LENGTH. 16 mm (♂), 17 mm (♀).

ADULT (Figs 354, 355). Ground colour of wings whitish, irregularly striated with blackish-grey; postmedian area wholly suffused with blackish-grey except for a whitish blotch at apex of fore wing and near anal angle of hind wing. Lines reduced, but their position marked by black maculae on costa of fore wing; median present as an indistinct fascia. Discal spots faint or absent. Underside similar, but dark markings much more intense, dark black-and-brown. Vestiture of thorax and abdomen greyish on upper and white, speckled with black, on underside. Hind tibia of ♂ dilated. Seta comb on A3 present.

MALE GENITALIA (Fig. 677). Uncus horns and gnathos well developed. Valves massive. Costa recurved, not dilated apically and bearing a prominent, curved process. Sacculus about twice width of costa, with distal margin modified to form a short, curved process. Aedeagus of medium size, approximately cylindrical, and truncated anteriorly. Vesica bearing a

single, long, needle-like median and exhibiting a dorsal group of microcornuti a short distance from apex. Octavals very conspicuous, tips truncated.

**FEMALE GENITALIA** (Fig. 898). Papillae anales normal. Apophyses posteriores slender; a. anteriores somewhat stouter, less than half length of former. Sterigma: l. postvaginalis forming conspicuous lateral sclerotizations. Antrum large and rather shell-shaped. Bursa copulatrix elongated; ductus ribbed, well sclerotized, gradually widening into membranous corpus. Signum prominent, circular, situated near centre of corpus.

**DIAGNOSIS.** A quite unmistakable species.

**BIOLOGY.** Adults have been collected in November and from February–June.

**DISTRIBUTION.** Northern Zambia, Zaire and Tanzania.

**MATERIAL.** 8♂ (1 dissected, genitalia slide M. Krüger No. 3) (NMKE) and 9♀ (1 dissected, genitalia slide M. Krüger No. 4) (NMKE). 1 Tervuren (MRAC), 15 Nairobi (NMKE), 1 Bulawayo (NMBZ).

**LOCALITIES.** **Zambia:** Abercorn (6), Mbalo, Abercorn (7), Lake Chila, Abercorn (1). **Tanzania:** Mawanga Forest, Songea (1). **[Zaire]:** (Congo), Elisabethville (1), Kolwezi, Katanga Prov. (1).

## 10. *Chiasmia crassilembaria*-group

The seven species that make up this group possess a typical facies (Figs 356–367). The moths are ochreous, brown or reddish and characterized by narrow fore wings (notably the males) and broad, crenulated hind wings; the antennae are ciliate in both sexes, though thicker in the ♂. The autapomorphy for the group is provided by the broadly funnel-shaped development of the antrum in the female genitalia.

**MALE GENITALIA** (Figs 678–683). Uncus horns medium-sized to very well developed; gnathos of modest proportions. Shape of valves subject to some variation: straight to slightly recurved, without (*C. crassilembaria*) or with process in subapical (*inouei*) or median (*C. maronga*, *aureobrunnea*, *peremarginata*) position or arising from near base (*umbrata*). The sacculus is typically somewhat squarish with well-chitinized interior margin and some discrete sclerotizations. Aedeagus varying in length, but always rather massive; vesica with one or several cornuti; in addition, groups of microcornuti or striations may be present. Octavals arcuate and rounded, though depth of emargination varies.

**FEMALE GENITALIA** (Figs 899–903). Papillae anales relatively small. Apophyses weak. Sterigma: l. antevaginalis not modified; l. postvaginalis, where

present, restricted to forming mostly small sclerotizations on sides of antrum; these are well developed in *C. umbrata* only. Antrum varying in size, but of typical, broadly funnel-shaped build. The antrum is small in *C. crassilembaria* and *umbrata*, medium-sized in *maronga* and reaches its greatest development in *C. aureobrunnea*. An aberrant development can be seen in *C. inouei*: the antrum appears to be reduced, while the wall of the ductus bursae has assumed a leathery texture; ductus seminalis greatly developed, branching off d. bursae fairly anteriorly. Bursa copulatrix more or less pyriform with strongly ribbed ductus and membranous corpus bursae (except for *C. inouei*, where it is thinly spiniferous); signum medium-sized to very large.

Species of the *crassilembaria*-group are inhabitants of subtropical and tropical forests and savannas; they occur throughout the Afrotropical region including Madagascar.

## Key to species

- 1 Small (fw length 13–14 mm), dark brown and ochreous moths (Figs 364, 365). ♂ genitalia (Fig. 682) with massive, slightly recurved costa bearing small ventral process. ♀ genitalia (Fig. 902) with strongly developed antrum and small signum. Uganda .....  
..... 101. *aureobrunnea* sp. n., p. 205
- Small to medium-sized (fw length 12–16 mm), usually paler species (Figs 356–363, 366, 367). ♂ (Figs 678–681, 683) and ♀ (Figs 899–901, 903) genitalia not as above. Throughout study area ..... 2
- 2(1) Adults as in Figs 357–363, 366, 367. ♂ genitalia (Figs 679–681, 683) with ventral process on costa. ♀ genitalia, where known, as in Figs 909, 901, 903. African mainland ..... 3
- Adults as in Fig. 356. ♂ genitalia (Fig. 678) with costa showing faint ventral dilatation only. ♀ genitalia (Fig. 899) with small antrum, not as above. Madagascar .....  
..... 97. *crassilembaria* (Mabille), p. 202
- 3(2) ♂ genitalia (Fig. 683) with ventral process very short, arising near apex of costa. ♀ genitalia (Fig. 903) with characteristic antrum. Adult (Figs 366, 367) greyish-brown with beautifully marbled underside. Rwanda, Uganda, Tanzania, Cameroon ..... 102. *inouei* (Herbulot), p. 206
- ♂ genitalia (Figs 679–681) with ventral process of costa somewhat larger, arising further down. ♀ genitalia, where known (Figs 900, 901), not as above. Adults (Figs 357–363) not as above .....  
..... 4
- 4(3) Adult variable (Figs 358–360). ♂ genitalia (Fig. 680) with slender, elongated costa and small, scarcely excised octavals. ♀ genitalia (Fig. 900) with large, rounded corpus bursae and promi-

- nent signum. Widely distributed .....  
..... 99. *umbrata* (Warren), p. 203
- Moths greyish with achatineous underside (Fig. 362), yellowish-ochre (Fig. 357), or, if reddish-brown as above, of smaller size (Figs 361–363). ♂ (Figs 679, 681) and ♀ genitalia, where known (Fig. 901) not as above. Ranges may overlap with that of *umbrata* ..... 5
- 5(4) Reddish-brown moths, ♂ with narrow fore wings (Figs 361–363). ♂ genitalia (Fig. 681) with fairly slender costa and widely separated octavals. ♀ genitalia (Fig. 901) elongated. Eastern Zimbabwe and Moçambique .....  
..... 100. *maronga* sp. n., p. 204
- Yellowish-ochre moths (Fig. 357); fore wing of ♂ narrow but less so. ♂ genitalia (Fig. 679) with massive costa; octavals less widely separated than above. ♀ unknown. Cameroon; Ivory Coast ..... 98. *peremarginata* sp. n., p. 202

**97. *Chiasmia crassilembaria* (Mabille, 1880)**  
comb. n.

Figs 356; 678, 899

*Macaria crassilembaria* Mabille, 1880: 23. Type material: an unstated number of syntypes of both sexes. **Madagascar.** Probably lost (Viertel & Fletcher, 1968) [not examined]. Mabille's description is short and not accompanied by illustrations. However, *crassilembaria* is the only Madagascan representative of its group, so that confusion with the similar *C. maronga* sp. n. from Moçambique and eastern Zimbabwe can be excluded.

*Macaria crassilembaria* Mabille; Hampson, 1910: 468.  
†*Semiothisa crassilimbaria* (Mabille); Fawcett, 1916: 726; Herboulot, 1972: 144. An incorrect subsequent spelling.

*Semiothisa crassilembaria* (Mabille); Herboulot, 1956: 249; 1964: 255; 1980: 272.

**FORE WING LENGTH.** 12 mm (♂), 13 mm (♀).

**ADULT** (Fig. 356). Small. Fore wings of male very narrow. Ground colour of wings ochreous, finely striated with grey; postmedian area darker, more olivaceous, in some specimens with dark maculation. Basal and median line absent or indistinct; postmedian better developed, especially in ♂, but also not prominent. Discal spots virtually absent on fore wing, small on hind wing. Preapical spot on fore wing brown. Underside vividly ochreous yellow with fine grey striations, discal spots and median line similarly developed as on upperside. Postmedian area brown with ochreous blotches near apex of fore wing and at anal angle of hind wing. Vestiture of body ochreous, with grey dusting. Hind tibia of ♂ damaged in examined specimen. Setal comb on A3 present.

**MALE GENITALIA** (Fig. 678). Uncus horns well developed; gnathos normal. Costa of valve rather massive, not dilated apically and with localized widening of distal margin, but lacking process. Sacculus not prominent, termen somewhat truncated. Aedeagus stout; vesica with a single, drop-shaped median cornutus and exhibiting a small spinose area near apex.

**FEMALE GENITALIA** (Fig. 899). Papillae anales rounded. Both pairs of apophyses moderately slender, a. anteriores less than half length of a. posteriores. Antrum shell-shaped, slender. Bursa copulatrix pear-shaped, elongated. Ductus bursae ribbed, gradually widening into corpus; signum medium-sized, slightly elliptical.

**DIAGNOSIS.** Similar to 99. *C. umbrata* and 100. *C. maronga*, below, but markedly smaller and more ochreous in coloration. The differences in genitalic structure are evident from the illustrations (compare Figs 678, 680, 681 and 899–901).

**BIOLOGY.** Adults have been collected in Madagascar in dry as well as fairly moist habitats; adults are active February–April and June–August.

**DISTRIBUTION.** Madagascar and Comoro Islands. Records from the African mainland are erroneous.

**MATERIAL.** 45♂ (2 dissected, Geometridae genitalia slide No. 16123 (BMNH); TM genitalia slide No. 11277) and 18♀ (3 dissected, genitalia slide M. Krüger No. 16 (MNHN), Geometridae genitalia slides No. 16124, 16955) (BMNH). 23 London (BMNH), 39 Paris (MNHN), 1 Pretoria (TM).

**LOCALITIES.** **Madagascar:** Diego Suarez (21), NE., Kulau (1), NE., Sakaramy (1), C., Ambositra-Ambohimanga road, km 39, 1350 m (1), C., Antananarivo, Parc Tsimbazaza, 1200 m (1), N., Ht. Sambirano road, 10 km from Ambanja, Col du Bekaka, 140 m (2), N., Tsaratanana counterforts (2), S., env. Tulear, 40 m (2), E., NW. of Fort Dauphin, Andohalelo Massive, Andranomangana Forest, 1770 m (12), W., new Ambondromany-Port Bergé Vaovao road at km 122, Sarodrano Forest, 140 m (6), W., Zombitsy matsabory special reserve, 640 m (1), Ambovombe (1). **Comoros:** Grande Comore, 4–5 km E. of Niombadjou, Bandalamadji, 640 m (1), Capitaine Dubois road between Boboni and M'Lima Manda, Djadjou, 800 m (2).

**98. *Chiasmia peremarginata* sp. n.**

Figs 357; 679

**TYPE MATERIAL.** Holotype ♂, **Cameroon:** Cameroun, Mont Kala, 18 km W. de Yaoundé, 900 à 1100 m, 30.III.1975 (C. Herboulot collection). Paratypes (8♂). **Cameroon:** 2 ♂♂, 9 km N d'Edea, 7., 8.IV.1970 (C.

Herbulot); 2♂, Ayos, Galerie du Nyong, 15 km de M'Balmayo, 24.XI., 4.–13.III.1973 (A. Evoé); 1♂, Massif du Manengouba, Nsoung, 1400 m, 25.–31.III.1973 (A. Evoé); 1♂, Elang, 40 km SSE Yaoundé (P. Darge); 1♂, Env[irons] de Yaoundé, Nkokiyong, 1150 m, 10.I.1975. **Ivory Coast:** 1♂, Yapo Sud, 22 km SSE Agboville, 12.–18.IV.[19]69 (C. Herbulot), genitalia slide C. Herbulot No. 5159 (C. Herbulot collection).

**FORE WING LENGTH.** 13–14 mm (♂).

**ADULT ♂** (Fig. 357). Of medium size; antennae ciliate. Fore wing narrow, termen of hind wing strongly emarginate. Ground colour of wings yellowish-brown, with intense brown dusting and striation; postmedian area suffused with brown and grey. Lines incomplete but dark spots present where they meet costa of fore wing; median line developed as a diffuse fascia. Preapical spot present, brown. Discal spots present but inconspicuous. Underside similar; contrast between yellowish basal and median and brown postmedian area more striking. Vestiture of thorax and abdomen brown on upper and ochreous on underside. Hind tibia of ♂ not modified. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 679). Uncus horns heavily sclerotized; gnathos rather weak, with delicate arms. Valves elongated. Costa massive, slightly recurved and bearing a single, short ventral process. Sacculus small, deeply emarginate. Aedeagus long, irregularly fusiform. Vesica bearing one long, needle-like median, and a small, roundish second cornutus below tip of first. A transverse band of denticles present about one-third from apex. Octavals heavily sclerotized, w-shaped.

**DIAGNOSIS.** Similar to *Chiasmia crassilembaria* from Madagascar and *C. maronga* from Moçambique and Zimbabwe, but may be distinguished by its lighter, yellowish coloration in the basal and median area of wings and, particularly, the strongly emarginate termen of the hind wing.

**BIOLOGY.** The species is associated with tropical forest at altitudes between 900–1400 m. Adults have been collected in November, January, and March–April.

**DISTRIBUTION.** Cameroon and Ivory Coast.

**ETYMOLOGY.** From Latin prefix *per*, very, and *emarginatus* (-a, -um), hollowed out; in reference to the strongly emarginate sacculus of the male genitalia.

#### 99. *Chiasmia umbrata umbrata* (Warren, 1897) comb. n.

Figs 358–360; 680, 900; 1009

*Gubaria umbrata* Warren, 1897a: 109. Holotype ♂,

**[South Africa, KwaZulu-Natal]**: Natal (A.J. Spiller); Rothschild Bequest B.M. 1939–1.; IV.109/ *Gubaria umbrata* Warr. ♂ type (BMNH) [examined].

*Semiothisa sherrata* Swinhoe, 1904: 505. Holotype ♂, [**?Zaire**]: Congo, 87.75; *Semiothisa sherrata* Swinhoe ♂ type (BMNH) [examined].

*Macara umbrata* (Warren); Janse, 1917: 114.

*Semiothisa umbrata* (Warren); Janse, 1932: 217; Prout, 1932a: 491; Herbulot, 1954b: 324; 1981: 224; Fletcher, 1958b: 131; 1978a: 80.

*Semiothisa sherrata* Swinhoe; Herbulot, 1954b: 324 (synonymy); Fletcher, 1958b: 131; 1978a: 80 (as synonym of *umbrata*).

**FORE WING LENGTH.** 12–15 mm (♂), 12–16 mm (♀).

**ADULT** (Figs 358–360). Variable in coloration, but ♀ lighter; this sex also with broader wings. Ground colour of wings ochreous, heavily dusted with dark greyish-brown in ♂ and with brown in ♀, usually leaving a paler fascia between discal spot and postmedian line; this may, however, be absent. Basal and median lines absent or, if present, ill defined, more like fasciae; postmedian line usually well developed, acutely angled below costa of fore wing. Discal spots variously developed. Postmedian area mostly darker, usually with some dark brown to blackish maculation. Underside ochreous, irregularly striated with grey-brown in basal and median area. Median line and discal spots variously developed, but similar to upperside. Postmedian area more or less wholly brown, again darker in ♂, with some ochreous maculation along termen. Vestiture of thorax and abdomen dark greyish-brown on upperside and ochreous on underside in ♂, in ♀, ochreous speckled with grey on both sides. Hind tibia of ♂ dilated, bearing hair-pencil partly hidden in groove on inner side. Setal comb on A3 present.

**MALE GENITALIA** (Fig. 680). Uncus horns well developed; gnathos with slender arms and prominent medial element. Costa of valve elongated, bearing a small ventral process. Sacculus about twice width of costa, angular. Aedeagus fairly slender, spindle-shaped; vesica with a single short median cornutus and a small subapical group of microcornuti. Octavals trapezoidal, shallow.

**FEMALE GENITALIA** (Fig. 900). Papillae anales of medium size, slightly pointed. Both pairs of apophyses moderately slender, a. anteriores about two-thirds length of a. posteriores. Sterigma: l. antevaginalis not modified, l. postvaginalis forming convoluted sclerotizations around ostium. Antrum shell-shaped, well developed. Bursa copulatrix pear shaped. Ductus bursae ribbed, abruptly widening into the large and rounded corpus. Signum prominent, rounded.

**EARLY STAGES.** Egg: length 0.6 mm, width 0.37 mm,

light green, darkening prior to hatching. Shape and sculpture typical for the genus (Fig. 1b). Larva. First instar: length 1.2 mm, width 0.2 mm. Head: width 0.25 mm, light brown, ocelli darker. Body evenly ochreous, with lateral areas slightly lighter. The description of the mature larva given by Taylor (1953) refers to *C. brongusaria*.

**DIAGNOSIS.** Similar to 100. *C. maronga*, below. Males of that species are usually larger, with broader fore wings. In the male genitalia, the octavals and structure of the aedeagus offer the best diagnostic characters for separating the two species: in *C. umbrata*, the octavals are smaller and more strongly sclerotized, while the aedeagus has a smaller median cornutus and carries a spinose area below the tip which is absent in *C. maronga*.

**BIOLOGY.** The larva was reared by N.J. Duke on *Entada spicata* (E. Meyer) Druce (= *E. natalensis* Benth.) (Mimosidae). The distribution of the moth suggests that other food plants are utilized as well. Adults of ssp. *umbrata* have been collected from January to May, in September, and November–December.

**DISTRIBUTION** (Fig. 1009). Widely distributed in eastern Africa and also recorded from Zaire and Nigeria. In southern Africa largely restricted to eastern parts of the Transvaal and to KwaZulu-Natal; also in Swaziland and Transkei and, more localized, in Zimbabwe and Moçambique.

**MATERIAL.** 132♂ (2 dissected, TM genitalia slides No. 978, 10825) and 71♀ (4 dissected, TM genitalia slides No. 10826, 11053, 11275; ZSBS genitalia slide No. G 6889), 2 London (BMNH), 3 Berlin (ZMHB), 7 Munich (ZSBS), 153 Pretoria (TM), 2 Cape Town (SAM), 17 Bulawayo (NMBZ), 14 N.J. Duke collection, 4 H.S. Staude collection.

**LOCALITIES.** **South Africa, Transvaal:** [Northern Province]: Sudwala Caves (1), Three Sisters (3), Politsi (1), Cyprus Farm/Ofcolaco (4), Mahuba's Kloof (9), Marieps Mtn (10), Malta, Ptbg. (8), Selati (1), Blyde River Nature Reserve (4), Louis Trichardt (1), Louis Trichardt, Hanglip Forestry (1), Chuniespoort (1). [Mpumalanga]: Erasmus Reserve, Pilgrim's Rest District (4), Bergvliet Forestry, Sabie District (3), Lydenburg District (1), Fourteen Streams, Barberton District (6), White River (4), Nelshoogte Forestry, Barberton District (12), Barberton (19), Nelspruit, 800 m (7), Uitsoek, Waterval area (11), De Hoop 203 JU, Nelspruit District (1). **KwaZulu-Natal:** Umgazi River Mouth (1), Durban (6), Umkomaas (6), Pinetown (2), Mboma (4), Yellowwoods, Balgowan (1), Dukuduku Forest (1), Ingwavuma (1), Shongweni Dam (1), Umdoni Park (2), Krantzloof (4). **Cape Province:** [Eastern Cape]: Haga Haga (1), Beacon Bay (1), Kei Cuttings (2), The Haven (5), Port St. John's (7), Dwesa

Forest (1). **Swaziland:** Malagwane Hill, Mbabane (2). Malolotja (1). **Zimbabwe:** Mt. Selinda (12), Victoria District (1), Wankie (1). **Zambia:** 8 m N. Livingstone (2). **Moçambique:** Moribane Forest (2), Maronga Forest (1), Serra Rotanda, E. of Chimanimani Mts (3), Serra Rotanda, Mussapa River Forest (1). **Tanzania:** (German East Africa), Lindi (2), Daressalam (1); (Tanganyika), Mt. Meru, Momella, 1600–1800 m (1). Nderema (1). **Uganda:** Zika Forest, Entebbe (3), Entebbe (1). **Zaire:** (Congo Belge), Go, Uelle District (1), Bopoto (1). **Nigeria:** S., Kano (3); S., Kaduna (1). **Senegal:** Kaolack (1).

#### 99a. *Chiasmia umbrata juvenilis* (Herbulot, 1964) comb. n.

not illustrated

*Semiothisa umbrata juvenilis* Herbulot, 1964: 257. Holotype ♂, **Madagascar:** Type; Madagascar Nord, contreforts du Tsaratanana, Haut Sambirano, 1200 m, vallée de la Besantri, 5.–9.xii.1963, P. Viette; *Semiothisa umbrata juvenilis* Hrblt. Type; *Semiothisa umbrata juvenilis* Hrblt., Bull. Soc. ent. Fr., 1965, 69, (1964), p. 257 (MNHN) [examined].

**DIAGNOSIS.** Adult (description translated from the original). ‘On the underside of the wings, and particularly of the fore wings, the brown antemedian band is much smaller than in the nominotypical form. In addition, the eighth sternite is more deeply excised between the octavals.’ From the limited amount of material examined, it is difficult to decide on the validity of this taxon. The male holotype is a large and clearly marked example.

**DISTRIBUTION.** Madagascar, predominantly in northern and eastern parts.

**BIOLOGY.** Adults are active from November to December and in February.

**MATERIAL.** 11♂ and 4♀. 1 London (BMNH), 14 Paris (MNHN).

**LOCALITIES.** **Madagascar:** N., Ht. Sambirano road, 10 km from Ambanja, Col du Bekaka, 140 m (4), E., env. Périerin, 910 m, Analamazoatra Forest (9), C., La Mandraka, 1230 m (1), Tsimbazaza/Tananarivo (1).

#### 100. *Chiasmia maronga* sp. n.

Figs 361–363; 681, 901; 1010

**TYPE MATERIAL.** Holotype ♂, **Moçambique:** Maronga Forest, 20°03'S 33°09'E, 6.–11.IX.1972 (R.H. Jones); TM Lep[idoptera] Het[erocera] Genitalia slide No. 10827 (TM). Paratypes (12♂, 7♀). **Moçambique:**

1♂, same data as holotype. **Zimbabwe:** 7♂, 7♀, Aberfoyle, Honde Valley, 24.10.1992 (N.J. Duke) (1♀ dissected, TM Lep[idoptera] Het[erocera] Genitalia slide No. 11232); 1♂, *ibidem*, dated 26.04.1993; 1♂, *ibidem*, dated 3–4.XII.1994 (N.J. Duke); 2♂, *ibidem*, dated 20–21.IV.1996 (N.J. Duke) (TM).

FORE WING LENGTH. 13–14 mm (♂), 13–15 mm (♀).

**ADULT** (Figs 361–363). Fore wings of ♂ very narrow, particularly tornus broadly rounded. Wings of ♀ broader, with more strongly crenulated termen of hind wing. Ground colour of wings ochreous, heavily dusted with brownish-grey in basal and median area; postmedian area purplish-grey, with a row of dark spots distal of postmedian line. Basal and median lines faint and ill defined; postmedian line better developed, dark brown. Discal spots weak, larger on hind wings. Preapical spot well developed, brown. Underside pale ochreous, irregularly striated with chocolate brown in basal and median area; median line broad, discal spots not conspicuous. Postmedian area chocolate brown, an ochreous blotch present near anal angle of hind wing. Thorax and abdomen reddish brown with darker dusting on upperside, ochreous-grey on underside. Hind tibia of ♂ somewhat dilated, bearing small hair-pencil in groove on inner side. A3 damaged in slide preparation examined.

**MALE GENITALIA** (Fig. 681). Uncus horns well developed; gnathos normal. Costa of valve long, straight, with a short and blunt ventral process. Sacculus large, termen extended to form a short, curved process. Aedeagus stout and spindle-shaped; vesica bearing a single median cornutus and exhibiting a dorsal patch of microcornuti. Octavals weakly sclerotized, arcuate.

**FEMALE GENITALIA** (Fig. 901). Papillae anales rounded. Apophyses fairly slender, a. anteriores about half length of a. posteriores. Sterigma: l. antevaginalis forming a weakly sclerotized shield, sclerotizations of l. postvaginalis small. Antrum prominent, broadly funnel-shaped, joining membranous part of ductus bursae below posteriormost point. Bursa copulatrix elongated. Ductus broad, weakly ribbed. Corpus membranous, somewhat elliptical. Signum circular, medium-sized and situated near centre of corpus.

**DIAGNOSIS.** Similar to certain specimens of 99. *C. umbrata*, above. See diagnosis under that species.

**BIOLOGY.** Apparently associated with subtropical forests. Adults have been collected in September–October and in April. The winter specimens are much darker, suggesting a similar seasonal dimorphism as in *C. umbrata*.

**FURTHER MATERIAL.** 12♂ and 8♀. **Zimbabwe:** Aberfoyle, Honde Valley (20) (TM).

**DISTRIBUTION** (Fig. 1010). So far only known from

two localities in Moçambique and the escarpment area of eastern Zimbabwe.

**ETYMOLOGY.** Named after the type locality.

### 101. *Chiasmia aureobrunnea* sp. n.

Figs 364, 365; 682, 902

**TYPE MATERIAL.** Holotype ♂, **Uganda:** Kayonza, Kigezi [Province], Mar[ch] 1967 (R.C. Otieno); Brit. Mus. 1968–684; Geometridae genitalia slide No. 16945 (BMNH). Paratype (1♀). **Uganda:** Kalinzu Forest, Ankole (Scheven); Kal[inzu] 288; genitalia slide M. Krüger No. 24 (NMKE).

FORE WING LENGTH. 13 mm (♂), 14 mm (♀).

**ADULT** (Figs 364, 365). Medium-sized. Termen of fore wing slightly emarginate below apex; termen of hind wing crenulated. Ground colour of wings intense golden ochre, densely suffused with brown. Postmedian area somewhat darker. Preapical spot dark brown. All lines reduced on fore wing, but their position marked by dark spots along costa. On hind wing, median and postmedian double and undulating, dark brown. Discal spots minute on fore, larger on hind wing. Underside beautifully golden ochre with dense darker dusting; discal spots and median line prominent. Postmedian area nearly wholly suffused with brown except for lighter markings on apex of fore wing and near anal angle of hind wing. Vestiture of thorax and abdomen ochreous brown. Hind tibia of ♂ lost. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 682). Uncus horns comparatively small, curved; gnathos well developed. Costa of valve stout, slightly recurved and bearing a single ventral process arising near middle. Sacculus hardly wider than costa, exhibiting comma-shaped sclerotization. Aedeagus large relative to remainder of genitalia, straight and slightly fusiform. Vesica bearing a single, needle-like cornutus; apex with two patches of microcornuti. Octavals arcuate, fairly shallow.

**FEMALE GENITALIA** (Fig. 902). Papillae anales small and pointed. Both pairs of apophyses rather slender, a. anteriores reaching about half length of a. posteriores. Sterigma not modified. Antrum very prominent, funnel-shaped. Bursa copulatrix elongated; ductus bursae wide, with posteriormost part sclerotized. Corpus bursae hardly wider than ductus, membranous; signum circular, rather small.

**DIAGNOSIS.** Easily recognized by the comparatively narrow wings and rich gold-brown colour, particularly on the underside. The female genitalia, although smaller, are similar to those of 102. *C. inouei*, below (compare Figs 902, 903).

BIOLOGY. This species is probably associated with tropical forests. Adults are active in March.

DISTRIBUTION. Uganda, recorded from Kigezi and Ankole provinces.

ETYMOLOGY. From Latin *aureus* (-*a*, -*um*), golden, and *brunneus* (-*a*, -*um*), brown; in allusion to the insect's coloration.

**102. *Chiasmia inouei inouei* (Herbulot, 1987)**  
comb. n.

Figs 366, 367; 683, 903

*Semiothisa inouei* Herbulot, 1987: 278. Holotype ♂,

Rwanda: Nyungwe Forest, Route Delvaux [au] km 21, 2000 m, 2.XI.1974 (B. Turlin); P[réparation] No. 5163 C. Herbulot; *Semiothisa inouei* Hrblt.

Holotype (C. Herbulot collection) [examined]. Paratypes (3♂, 4♀). Rwanda: 1♂, 1♀, same data as holotype (B. Turlin); 1♂, *ibidem*, at km 3, 2200 m, 29.XII.1974 (B. Turlin); 1♂, 3♀, Nyungwe Forest, Wincka, 2500 m, 31.X.1975 (B. Turlin); genitalia slide C. Herbulot No. 6413 (C. Herbulot collection, BMNH) [examined].

‡*Tephrina*(?) *cryptocala* Prout. Type ♀, [Zaire]: 35.24. Katana, W. Kivu, 5000–7000 f[ee]t, highland forest bordering pasture land, April [19]24, Beginning of wet season (T.A. Barns); *Tephrina* (?) *cryptocala* Prout ♀type; Joicey Bequest B.M. 1934–120; Manuscript name (BMNH) [examined].

FORE WING LENGTH. 14–16 mm (both sexes).

ADULT (Figs 366, 367). Well medium-sized. Termen of fore wing weakly emarginate below apex; termen of hind wing gently crenulated. Wings glossy. Ground colour ochreous, with extensive grey suffusion, particularly in postmedian areas. Lines very indistinct, but their position marked by three maculae along costa of fore wing. Preapical spot well developed, grey. Discal spots present but inconspicuous. Underside beautifully marked: hind wing yellowish with darker dusting; a broad brown fascia bordered by black running across wing. Apex of fore wing distal of preapical spot with a large yellowish blotch. Discal spots very faint on fore wing, better developed on hind wing. Body greyish on upper- and yellowish on underside. Hind tibia of ♂ not dilated. Setal comb on A3 absent.

MALE GENITALIA (Fig. 683). Uncus horns massive and curved; gnathos as in other species of this group. Costa of valve slightly curved, somewhat truncated apically; ventral process small. Aedeagus robust, anterior half well sclerotized. Vesica bearing one long, rod-like, and a second, much stouter cornutus; two groups of microcornuti also present. Octavals large and arcuate, broader in ssp. *inouei*.

FEMALE GENITALIA (Fig. 903). Papillae anales well developed, rounded. Both pairs of apophyses delicate; a. anteriores about half length of a. posteriores. Antrum very large, well sclerotized. Bursa copulatrix pear-shaped; posterior section of ductus bursae sclerotized and extending beyond connection with antrum. Wall of corpus membranous, bearing numerous small denticles around signum. The latter well developed, circular, situated near centre of corpus.

DIAGNOSIS. The species is quite unmistakable on account of its beautifully marked underside.

BIOLOGY. *Chiasmia inouei* is an afromontane species associated with tropical forests. Adults have been collected in March–May and from October–December.

DISTRIBUTION. Rwanda, Uganda, Tanzania and presumably also Zaire (see Remarks). Altitudinal range 2000–2500 m.

MATERIAL. 7♂ (2 dissected, genitalia slide M. Krüger No. 40) (NMKE); ZSM genitalia slide No. G 6734 and 6♀ (1 dissected, genitalia slide M. Krüger No. 16 (NMKE)). 12 Nairobi (NMKE), 1 Munich (ZSBS).

LOCALITIES. Uganda: Toro, Kibale Forest (2); Fort Portal (2); Mpanga Forest, Fort Portal (1); Kalinzu Forest, Ankole (3); Impenetrable Forest, Kigezi (4). Tanzania: Mpanda (1).

REMARKS. In view of the paucity of material available for examination, it remains difficult to assess the validity of ssp. *ponentis* (Herbulot). The 'type' of *cryptocala* Prout was collected in an area between the known localities of *i. inouei* and *i. ponentis*; it is here treated as belonging to the nominate subspecies.

**102a. *Chiasmia inouei ponentis* (Herbulot, 1987)**  
comb. n.

not illustrated

*Semiothisa inouei ponentis* Herbulot, 1987: 278. Holotype ♂, Cameroon: Village Manengouba, 1040 m, 10.IV.1972 (C. Herbulot); *Semiothisa inouei ponentis* Hrblt. Holotype (C. Herbulot collection) [examined]. Paratypes (2♂). Cameroon: 1♂, Manengouba Massive, 6 km NW of N'Kongsamba, 1400 m, 3.IV.1970 (C. Herbulot & C. Lemaire); 1♂, Mt. Cameroon, Musake Hut, 1830 m, 23.–26.XII.1973 (Ph. Darge & A. Evoé) (C. Herbulot collection) [examined].

DIAGNOSIS. Adult (description translated from the original). '♂. Differs from the nominotypical subspecies by the enlarged costal spots of the fore wings, by the reduction of the white coloration on the underside of the hind wings, by the eighth sternite which is less deeply excavated between the octavals and by the dis-

appearance of the process on the costa of the valves.' See Remarks under *Chiasmia i. inouei*, above.

MALE GENITALIA (not illustrated). As for nomino-typical *inouei*, but ventral process of costa vestigial and exhibiting narrower octavals.

DISTRIBUTION. Cameroon; the recorded altitudinal range is 1040–1830 m.

MATERIAL. Only the types were seen.

### 11. *Chiasmia contaminata*-group

This group combines two large, ochreous and rather conspicuous as well as a third, smaller and more sombre species resembling the members of the *brongusaria*-group. The moths have broad wings and rounded (*C. contaminata*, *lindemannae*) or tailed hind wings (*C. curvilineata*). A probable autapomorphy for the group is provided by the white underside of the wings, which is mottled in a conspicuous fashion with orange; this character is rather obscured in *C. lindemannae*, which may be found not to belong to this group once the male becomes known. A further autapomorphy is provided by the extremely elongated female genitalia. The antennae are ciliate in both sexes, though stronger in the male.

MALE GENITALIA (Figs 684, 685). Uncus horns and gnathos of medium size. Costa of valve quite massive, straight and lacking processes. Sacculus somewhat squarish or markedly truncated, in both cases with some localized sclerotizations. Aedeagus variable in respect to size and armament of vesica. Octavals prominent, rounded.

FEMALE GENITALIA (Figs 904–906). Papillae anales between rounded and pointed in shape; apophyses thin. Sterigma not modified. Antrum shell-shaped to pentagonal. Bursa copulatrix very elongated, formed like a long, gradually widening tube. Signum large or very large.

The species of the *contaminata*-group are strictly mountainous in occurrence; their range of distribution extends from Kenya southwards to south-eastern Zimbabwe; one species has also been recorded from Zaire and Cameroon.

### Key to species

- 1 Medium-sized (fw length 13–14 mm), very dark brownish-grey species with rounded hind wings (Fig. 370). ♂ unknown. ♀ genitalia (Fig. 905) moderately elongated, with shell-shaped antrum. Tanzania (Usambara Mts.) ..... 104. *lindemannae* (Fletcher), p. 208
- Larger (fw length 14–19 mm), ochreous species with rounded (Figs 368, 369) or tailed hind wings (Figs 371, 372). ♂ genitalia as in Figs 684, 685; ♀

genitalia (Figs 904, 906) with shell-shaped or hexagonal antrum, very elongated. Afromontane; locally throughout study area ..... 2

2(1) Moths with rounded hind wings (Figs 368, 369). ♂ genitalia (Fig. 684) with well developed, truncated sacculus. ♀ genitalia (Fig. 904) with hexagonal antrum. Kenya to Tanzania and Malawi; in southern Africa confined to Yumba Mountains and Mt. Selinda in south-eastern Zimbabwe ..... 103. *contaminata* (Warren), p. 207

— Moths with tailed hind wings (Figs 371, 372). ♂ genitalia (Fig. 685) with small, rounded sacculus. ♀ genitalia (Fig. 906) with shell-shaped antrum. East Africa (Rwanda, Uganda, Kenya, Tanzania); Zaire; Cameroon ..... 105. *curvilineata* (Warren), p. 208

### 103. *Chiasmia contaminata* (Warren, 1902) comb. n.

Figs 368, 369; 684, 904; 1011

*Gubaria contaminata* Warren, 1902: 528. LECTO-TYPE ♂, here designated, [Kenya]: (B[ritish] E[ast] A[frica]), Escarpment, III, [19]01, 6500–9000 ft (W. Doherty); IX.528/ *Gubaria contaminata* Warr. Type ♂; Rothschild Bequest B.M. 1939–1 (BMNH) [examined]. Paralectotypes (5♂, 2♀), [Kenya]: *ibidem*, dated January (♀), February (♂, ♀) and March (4♂) 1901 (BMNH) [examined].

*Semiothisa contaminata* (Warren); Swinhoe, 1904: 510; Fletcher, 1958a: 137; 1978a: 80.

FORE WING LENGTH. 14–17 mm (♂), 14–16 mm (♀).

ADULT (Figs 368, 369). Large. Ground colour of wings ochreous, suffused with grey; postmedian area usually darker, occasionally with some darker, round spots. Basal and median lines faint or absent; postmedian line well developed, fine, angled at about 90° below costa of fore wing. Discal spots faint on fore wings, well developed on hind wings. Underside pale orange, densely striated with light brown, but whitish along inner margin of hind wing. Discal spots clear, lines slightly less so. A small, round white spot near apex of fore wing. Vestiture of thorax and abdomen ochreous. Hind tibia of ♂ dilated. Setal comb on A3 present.

MALE GENITALIA (Fig. 684). Uncus horns well sclerotized; gnathos slender. Costa of valve massive, straight, not dilated apically and lacking ventral process. Sacculus well developed and angular; distal margin with some sclerotizations. Aedeagus narrow and elongated; vesica with a single, very thin cornutus in apical half. Octavals arcuate, with well rounded tips.

FEMALE GENITALIA (Fig. 904). Papillae anales fairly large. Both pairs of apophyses delicate, with a. anteriores

only about one-third length of a. posteriores. Sterigma: l. antevaginalis semicircular; l. postvaginalis not modified. Antrum hexagonal. Bursa copulatrix strongly elongated. Ductus bursae narrow, ribbed; gradually widening into tubular, membranous corpus. Signum stellate, circular, situated near centre of corpus.

**EARLY STAGES.** Egg: length 0.6 mm, width 0.42 mm, pale green and of normal *Chiasmia*-shape, but surface rather smooth. Larva. First instar: length 1.25 mm, width 0.2 mm. Head: width 0.25 mm, very pale brown, ocelli darker. Body: T1 dirtyish yellow; A1–10 yellowish green; T2–3 as abdominal segments but with slightly darker green dorsum. The larvae accepted *Albizia gummifera* (J.F. Gmelin) C.A. Smith, but rearing was unsuccessful due to poor food quality.

**DIAGNOSIS.** A characteristic species unlikely to be confused with other taxa.

**BIOLOGY.** *Chiasmia contaminata* is associated with montane subtropical forest. In the Bunga Forest area in eastern Zimbabwe (1800 m), the larva feeds probably on *Albizia gummifera* (J.F. Gmelin) C.A. Smith. Adults have been collected in January–February and in October–November.

**DISTRIBUTION** (Fig. 1014). From the escarpment in Kenya distributed southwards through Tanzania and Malawi; in southern Africa confined to Vumba Mountains and Mt. Selinda in southeastern Zimbabwe.

**MATERIAL.** 52♂ (1 dissected, TM genitalia slide No. 10871) and 38♀ (2 dissected, TM genitalia slides No. 10872, 11230). 1 Munich (ZSBS), 9 Nairobi (NMKE), 39 Pretoria (TM), 9 Bulawayo (NMBZ), 20 C. Herbulot collection, 11 N.J. Duke collection, 1 H.S. Staude collection.

**LOCALITIES.** **Zimbabwe:** Mutare (Umtali) District (1), Banti Forest, Chitora Hills (1), Burmah Valley (1), Vumba (13), Bunga Forest, Vumba (12), Laurenceville, Vumba (23), Mt. Selinda (1). **Malawi:** Zomba (6), Zomba Plateau, Kuchawe Inn, 1600 m (16), Mt. Zomba, 5700 ft (3), Bvumbwe (1). **Tanzania:** Marungu (1), Oldeani (3), N., Arusha (1). **Kenya:** Fort Hall (1), Nairobi (2), Two Camps, Kangema, Aberdares (3), Isiolo (1).

#### 104. *Chiasmia lindemannae* (Fletcher, 1958) comb. n.

Figs 370; 905

*Semiothisa lindemannae* Fletcher, 1958a: 138. Holotype ♀, [Tanzania]: Tanganjika, Usamb[ara]-B[erg], Sak[arani], 1500 m, 9.xi.1952, l[e]g[unt] Lindemann und Pavlitzki, Zoolog[ische] Staatss[amm]l[ung]; Photographed B.M. Neg[ative] 20321; Holotype ♀ *Semiothisa lindemannae* Fletcher, Staatssamm[ung]

München: *Semiothisa lindemannae* Fletcher Holotype ♀ (ZSBS) [examined]. Paratype (1♀). [Tanzania]: *ibidem*, 17.xi.1952; Geometridae genitalia slide No. 3687; Brit. Mus. 1957–566 (BMNH) [examined].

**FORE WING LENGTH.** 13–14 mm (♀).

**ADULT ♀** (Fig. 370). Fore wing rather rounded, hind wing with termen crenulated but lackingail. Ground colour whitish with extensive ochreous suffusion and darker grey dusting. Fore wing with exception of median area with rich vinaceous suffusion. All three lines present; postmedian angled below costa of fore wing; lines very faint on hind wing. Discal spots well developed, particularly on fore wing. Underside ochreous with fuscous irroration; vinaceous suffusion restricted to costa and apical region of fore wing. Vestiture of thorax and abdomen ochreous grey.

**FEMALE GENITALIA** (Fig. 905). Papillae anales medium-sized, appearing somewhat swollen. Both pairs of apophyses thin, a. anteriores rather less than half length of a. posteriores. Antrum shell-shaped. Bursa copulatrix large and membranous except for posteriormost part of ductus. Ductus bursae gradually widening into somewhat asymmetrical corpus. Signum medium-sized, situated near centre.

**DIAGNOSIS.** Similar to *Chiasmia contaminata*, above, but much darker, the fore wings more variegated. In particular the dark median fascia on the fore wing is characteristic.

**BIOLOGY.** The two known adults were collected in November, at an altitude of 1500 m.

**DISTRIBUTION.** So far only recorded from Usambara Mountains in Tanzania.

**MATERIAL.** Known from the types only.

#### 105. *Chiasmia curvilineata* (Warren, 1899) comb. n.

Figs 371, 372; 685, 906

*Semiothisa curvilineata* Warren, 1899b: 309. Holotype ♀, [Tanzania]: Nandi station, 16.III.[18]98 (Dr Ansorge); vi.309/*Semiothisa curvilineata* Warr. ♀ type; Type; Rothschild Bequest B.M. 1939–1 (BMNH) [examined].

*Semiothisa curvilineata* Warren; Debauche, 1938: 47; Fletcher, 1963: 23.

*Gonodela* [sic] *curvilineata* Warren; Debauche, 1938: 47 (erroneous citation of original combination with *Semiothisa*).

**FORE WING LENGTH.** 16–19 mm (♂), 16–18 mm (♀).

**ADULT** (Figs 371, 372). Rather large. Apex of fore

wings pointed, termen of hind wings with a pronounced tail. Ground colour of wings whitish, densely suffused with ochre, particularly on fore wings, and dusted with grey. All three lines brown, well developed on fore wing, basal line absent on hind wing. Discal spots moderately conspicuous. Termen of hind wing frequently with a row of whitish dots. Underside pale orange, striated with brown, markings slightly fainter than on upperside. Body ochreous with grey dusting. Hind tibia of ♂ dilated. Setal comb on A3 present.

**MALE GENITALIA** (Fig. 685). Uncus horns relatively short and stout; gnathos slender. Costa of valve very slightly recurved, not dilated apically and lacking ventral process. Sacculus rather narrow, well rounded, bearing a small, discrete sclerotization. Aedeagus short and stout, with a finely serrated ridge near apex; vesica without cornuti. Octavals broadly furcate.

**FEMALE GENITALIA** (Fig. 906). General appearance strongly elongated. Papillae anales normal. Both pairs of apophyses slender and rather short; a. anteriores about half length of a. posteriores. Sterigma not modified. Antrum shell-shaped, distal margin evenly rounded. Ductus bursae very long, lightly ribbed posteriorly and gradually widening into the elliptical corpus. Signum prominent, slightly elliptical and situated near centre of corpus.

**DIAGNOSIS.** *Chiasmia curvilineata* has a very characteristic facies and confusion with other taxa should not occur.

**BIOLOGY.** Within its afromontane distribution, the species appears to be more or less strictly associated with forests. Adults have been collected in February–March, May, and in October.

**DISTRIBUTION.** Most specimens are from East Africa, with records from Kenya, Uganda, Rwanda and Tanzania. Also recorded from Zaire and Cameroon. The altitudinal range is 2000–3000 m.

**MATERIAL.** 27♂ (1 dissected, Geometridae genitalia slide No. 16143) (BMNH) and 11♀ (1 dissected, Geometridae genitalia slide No. 16144) (BMNH). 18 London (BMNH), 2 Munich (ZSBS), 1 Bulawayo (NMBZ), 17 C. Herbolut collection.

**LOCALITIES.** **Kenya:** Escarpment, 6500–9000 ft (1); Nairobi (1), Nandi Plateau, 5700–6200 ft (1), S. & E. slopes of Mt. Kenya, 5–7000 ft (1), Isiolo (3). **Uganda:** Mafuga Forest, Kigezi (1), Ruwenzori, Nyinabitaba, 8650 ft (1), Ruwenzori, Mahoma River, 6700 ft (2), Ruwenzori, Mobuku Valley, 7800 ft (1), Ruwenzori, Namwamba Valley, 6500 ft (2), Ruwenzori, Fort Portal, 5000 ft (1), Ruwenzori, 6–7000 ft (4), Toro, Mpanga Forest, 4800 ft (1). **Rwanda:** SW., Nyungwe Forest, 2000 m (1), *ibidem*, 2700 m (2). **Tanzania:** near Kigoma (1); Mpanda, 2000 m (1). **Zaire:** Huri, Nioka (2).

**Cameroon:** Forêt de Bafut Nguemba, 9 km SE. of Bamenda, 2080 m (8), Préfecture de Kumbo, 5 km E. Oku, 2120 m (5).

## 12. *Chiasmia simplicilinea*-group

This group unites six rather large species of uniform appearance (Figs 373–387). The moths are characterized by pointed fore wings and a well developed ‘tail’ on the hind wing; coloration is variable and ranges from a uniform purplish-grey to a striking combination of black-and-white, mixed with orange. The antennae are ciliate in both sexes. Apomorphies other than adult habitus which define the group include structure of the valve and the presence of a cone-shaped operculum.

**MALE GENITALIA** (Figs 686–691). Uncus horns well developed; gnathos of medium size. Valves rather narrow; costa curved and somewhat pointed; an incompletely formed, blunt, short ventral process found in some species. Sacculus triangular and with inner margin sometimes extended to form a point (*C. simplicilinea*, *fulvinargo*, *affinis*, *austera*). Aedeagus comparatively large, fusiform or wedge-shaped; vesica bearing a single median cornutus of varying size; in addition, some striation may be present. Octavals rounded, mostly rather shallow.

**FEMALE GENITALIA** (Figs 907–911). Papillae anales pointed; apophyses of average thickness. Sterigma: I. antevaginalis not modified or taking the shape of a crescentic or shield-shaped area of heavier sclerotization; I. postvaginalis not modified. Operculum present. Antrum inconspicuous to well developed, showing some variation in shape. Bursa copulatrix generally elongated, tubular to pyriform. Ductus bursae of most species ribbed. Signum large to very large.

While *Chiasmia simplicilinea* is generally distributed throughout non-arid subsaharan Africa and Madagascar, the other members of the group share a common pattern of distribution, occurring in a broad corridor from West to East Africa, approximately extending between 10°N and 10°S.

### Key to species

- 1 Rather drab, olivaceous-grey moths with strongly developed postmedian line (Figs 373, 374). ♂ genitalia (Fig. 686) with triangular sacculus, short and stout aedeagus and small, knob-like octavals. ♀ unknown. Zaire ..... 106. *austera* (Prout), p. 210
- Violaceous-grey (Figs 385–387), olive-ochreous (Figs 375–378) or black-and-white species (Figs 379–384). ♂ and ♀ genitalia not as above. Throughout study area, one species in Madagascar ..... 2
- 2(1) Pale violaceous-grey species with poorly developed markings (Figs 385–387). ♂ genitalia (Fig. 691) with slender, markedly curved costa and weak sac-

- culus; aedeagus rather elongated, apically pointed. ♀ genitalia (Fig. 911) elongated, as illustrated. Fairly widespread in Afrotropical region .....  
..... 111. *kilinanjarensis* (Holland), p. 214
- Olive-ochreous (Figs 375–378) or black-and-white species (Figs 379–384). ♂ and ♀ genitalia not as above. Throughout study area, one species in Madagascar ..... 3
- 3(2) Moths ochreous with slight olive suffusion and well-developed line pattern (Figs 375–378). ♂ genitalia (Fig. 687) with short, blunt ventral process on costa; sacculus acutely pointed; aedeagus strongly spindle-shaped. ♀ genitalia (Fig. 907) flask-shaped, as illustrated. Widespread in Afrotropical region, including Madagascar .....  
..... 107. *simplicilinea* (Warren), p. 210
- Moths conspicuously marked in black and white, mixed with orange (Figs 379–384). ♂ and ♀ genitalia not as above. East to west Africa, absent from southern Africa and Madagascar ..... 4
- 4(3) Moths lacking conspicuous transverse lines across wings (Figs 383, 384). ♂ genitalia (Fig. 690) with curved costa and acutely pointed sacculus; octavals small and situated close together. ♀ genitalia (Fig. 910) pear-shaped with rather long ductus bursae. East and central Africa .....  
..... 110. *fulvimargo* (Warren), p. 213
- Moths with conspicuous transverse lines across both wings (Figs 379–382). ♂ and ♀ genitalia not as above ..... 5
- 5(4) Transverse lines on fore wing strongly developed, particularly between postmedian line and costa (Figs 381, 382). ♂ genitalia (Fig. 689) with square, rounded sacculus and strongly developed octavals. ♀ genitalia (Fig. 909) strongly elongated .....  
..... 109. *fulvisparsa* (Warren), p. 213
- Transverse lines on fore wing less well developed (Figs 379, 380). ♂ genitalia (Fig. 688) with triangular sacculus and smaller octavals. ♀ genitalia (Fig. 908) less elongated.... 108. *affinis* (Warren), p. 212

## 106. *Chiasmia austera* (Prout, 1932) comb. n.

Figs 373, 374; 686

*Semiothisa austera* Prout, 1932b: 247. Holotype ♂, [Zaire]: Holotype: Musée du Congo Belge, Monzambi, 15.XI.[19]05 (Waelbroeck); *Semiothisa austera* Prout ♂ type; R. det. 1989 (MRAC) [examined].

FORE WING LENGTH. 16–17 mm (♂).

ADULT ♂ (Figs 373, 374). Very sombre in appearance. Ground colour of wings ochreous, heavily suffused with greyish-brown, particularly in postmedian area. A heavy, double oblique line across wings; other lines faint and inconspicuous. Discal spots present

but not prominent. Underside white, densely striated with dark brown; median line broad, more like a fascia; postmedian area wholly dark brown except for some whitish blotches along termen. Body ochreous with grey irroration. Hind tibia of ♂ dilated. Setal comb on A3 present.

MALE GENITALIA (Fig. 686). Uncus horns large and curved; gnathos with relatively broad arms. Costa of valve fairly straight, slightly dilated apically; sacculus triangular, pointed. Aedeagus short and stout; vesica bearing a very small median cornutus. Octavals characteristic, resembling a figure of eight.

DIAGNOSIS. Similar to 112. *C. rectistriaria*, below; in both species, the oblique line across the wings is double and very heavily marked. However, *C. austera* is much darker and pure grey-and-brown in coloration, lacking any trace of olive or ochre. The differences in the male genitalia are evident from the illustrations (compare Figs 686 and 692).

BIOLOGY. A very rare species in collections. The male holotype was collected in November.

DISTRIBUTION. Zaire.

MATERIAL. 1 ♂ (dissected, Geometridae genitalia slide No. 16106 (BMNH)). 1 London (BMNH).

LOCALITIES. [?Zaire]: Congo, West Africa (1).

## 107. *Chiasmia simplicilinea simplicilinea* (Warren, 1905) comb. n.

Figs 375–378; 687, 907; 1012

*Acadra simplicilinea* Warren, 1905b: 401.  
LECTOTYPE ♂, here designated, [Tanzania]: Nguelo, Usambara (Dr Kummer); XII p. 408 [sic]/  
*Acadra simplicilinea* Warr. ♂ type; Rothschild Bequest B.M. 1939–1 (BMNH) [examined].

*Macaria simplicilinea* (Warren); Janse, 1917: 114.  
*Semiothisa simplicilinea* (Warren); Janse, 1932: 223;  
Fletcher, 1958a: 138; 1978a: 81; Pinhey, 1975: 86.

FORE WING LENGTH. 16–19 mm (both sexes).

ADULT (Figs 375–378). Fore wing narrow, hind wing with a pronounced tail. Ground colour of wings whitish, dusted with ochre to olive and showing some dark irroration. All three lines present, acutely angled below costa of fore wing. Basal line usually faint, absent on hind wing, median moderately well to well developed: postmedian strongly oblique and prominent. Discal spots inconspicuous to very prominent. Postmedian area mostly darker, olivaceous. Underside whitish with intense dark irroration; lines and discal spots as on

upperside. Postmedian area orange-brown with extensive whitish blotches along termen. Body ochreous with more or less heavy grey dusting; abdominal segments dorsally with some blackish spots. Hind tibia of ♂ dilated, carrying hair-pencil hidden in groove. Setal comb on A3 present. *Variation*: melanistic examples (Fig. 378) occur not infrequently; while these aberrations are unknown or absent in some areas, they may constitute up to 50% of some populations in some localities in Swaziland (N.J. Duke, *pers. comm.*).

**MALE GENITALIA** (Fig. 687). Uncus horns well developed, finely pointed; gnathos rather broad. Costa of valve slender, curved and exhibiting a blunt, broadly triangular process. Sacculus of medium size, inner margin acutely pointed. Aedeagus fusiform, extended to form a long tip. Vesica bearing a single, fairly short median cornutus. Octavals somewhat w-shaped, with evenly rounded tips.

**FEMALE GENITALIA** (Fig. 907). Papillae anales medium-sized, pointed. Both pairs of apophyses rather strong; a. anteriores over two-thirds length of a. posteriores. Lamella antevaginalis narrow, crescentic; l. postvaginalis not modified. Operculum dome-shaped. Antrum short, inconspicuous. Ductus bursae strongly ribbed posteriorly, gradually widening into pear-shaped corpus. Signum large, slightly elliptical.

**EARLY STAGES** (Figs 3, 6 i). Egg: Light green, length 0.6 mm, width 0.4 mm. Shape and sculpture typical of the genus. Larva. First instar: length 1.4 mm, width 0.18 mm. Head: width 0.25 mm, evenly olivaceous, ocelli darker. Body: T1–2, including legs, whitish-green; T3–A10 evenly yellowish-green. Descriptions of second and third instar larvae not available. Fourth instar: length 26 mm, width 2.2 mm. Head: width 2.0 mm, evenly green. Body: ground colour medium green. Dorsal area green, with two yellow addorsal lines present; intersegmental membranes yellowish. Sides with broad, bright yellow subdorsal line; 2 striking black maculae surrounding spiracles. Venter green; a faint yellowish ventral line present. Thoracic and abdominal legs green. Pupa: cremaster as in Fig. 6 i.

**DIAGNOSIS.** The adult is rather similar to 112, *C. rectistriaria*, below, but of slightly more slender built, with the oblique postmedian line simple and much finer. The differences in the genitalia are evident from the illustrations (compare Figs 687, 692 and 907, 912).

**BIOLOGY.** An euryoecious species with a very wide distribution in southern Africa, but absent from more arid areas. The larvae probably utilize a range a different *Acacia* species, including the introduced Australian species (wattle) (N.J. Duke, *pers. comm.*). In southern Africa, adults have been collected in all months of the year except June.

**DISTRIBUTION** (Fig. 1012). The nominate subspe-

cies generally distributed throughout eastern and southern Africa; in West Africa only recorded from Ivory Coast. In South Africa found along the Cape coast from Cape Town eastwards and widely distributed in KwaZulu-Natal and Transvaal provinces. The species becomes more local in Zimbabwe and Mozambique. The recorded altitudinal range is from sea-level to 2530 m.

**MATERIAL.** 306♂ (4 dissected, TM genitalia slides No. 976, 6395, 10013, 10812) and 139♀ (5 dissected, TM genitalia slides No. 10014–15, 10032–33, 10813), 6 Paris (MNHN), 27 Munich (ZSBS), 11 Bulawayo (NMBZ), 328 Pretoria (TM), 5 Pretoria (SANC), 4 Cape Town (SAM), 26 Nairobi (NMKE), 1 C. Herbulot collection, 15 N.J. Duke collection, 22 H.S. Staude collection.

**LOCALITIES.** **South Africa, Transvaal:** [Gauteng]: Johannesburg (4), Suikerbosrand Nature Reserve (11), Krugersdorp (9), Irene (1), Pretoria (2), Bronkhorstspruit (1), Boekenhoutskloof (3). [North-West]: Langverwacht, Vryheid District (10). [Northern Province]: Haenertsburg (1), Rietvlei (1), Mariepskop (4), Ohrigstad (1), Vivo (1), Bobomene (1), Graskop (6), Blyde River (2), The Downs, Soutpansberg (1), Woodbush (2), Mahuba's Kloof (1). [Mpumalanga]: Presidentsrus/Witbank (1), Pilgrim's Rest (13), Kowyn's Pass (2), Barberton (3), Fourteen Streams, Barberton District (1), Kalkoenkrans (2), Berlin Forestry (7), Sabie (1), Laersdrif, Middelburg District (1), Groblersdal (1), Pongola River (2). **Free State:** Sasolburg (10). **KwaZulu-Natal:** Durban (5), Umgababa (3), Richmond (1), Eshowe (3), Winklespruit (3), Kloof (2), Ngome Forest (3), Umdoni Park (16), Balgowan (3), Mtubatuba (1), Dukuduku Forest (2), Little Switzerland/Bergville (1), Bergville (3), Underberg (1), Umtentweni, Eden Park (1), Magude (2), Ingwavuma (2), Yellowwoods/Balgowan (15), Mboma (15), Muden (5), Utrecht (1), Everton (1), Pietermaritzburg (2), Hlabeni mist forest, 1500 m, Creighton District (1), Nottingham Road (1), Karkloof (4), Mkuzi Game Reserve (1), Cathedral Peak (2). **Cape Province:** [Western Cape]: Cape Town (1), Kirstenbosch (8), Paarl (2), Helderberg Nat. Res./Somerset West (1), Noordhoek, Cape Peninsula (2), Stellenbosch (3), Fish Hoek (2), Camps Bay (4), Clovelly (2), Du Toit's Kloof (4), Grootvaderbos, Heidelberg District (2), Kogelberg Nature Reserve (3), Mossel Bay (2), Brackenfell (2), Knysna (2), Diepwalle Forest/Knysna (1), Storms River (1), De Wet (1), Saasveld (6), Sedgefield (4), Slanghoek (1). [Eastern Cape]: Grahamstown (2), Groot River Pass (2), Kasouga (2), Oudebos on Garden Route (1), Tsitsikama (36), Addo National Park (1), Quinera River (1), Coldstream (1), Port Elizabeth (4), Beacon Bay (1), East London (5), Umtata (5), Langeni Forest (3), Mkambati (1). Ambiguous: Witteklip (1). **Lesotho:**

Maloti Mts., Oxbow, 2530 m (1), Mamathes (1), Mamohau, 2040 m (4), Katse, 2200 m (3). **Swaziland:** Havelock Mine (1), Phosphonyane River Falls, Piggs Peak District (1), Malagwane Hill, Mbabane (13). **Zimbabwe:** Vumba (5), Burmah Valley (1), Laurenceville, Vumba Mts (2), Bunga Forest, Vumba Mts (3), Chirinda Forest (1), Mt. Selinda (2), Harare (Salisbury) (1), Inyanga (4), Kariba (2). **Moçambique:** Chiluvo Hills (2). **Zambia:** Abercorn, Mbala (9). **Malawi:** Bvumbwe (1), Zomba (1). **Tanzania:** Amani, E. Usambara Mts (2), Nguelo, Usambara (5), Morogoro (2), Oldeani (3), Madibira (18), Sakarani (4), Marangu (3), Lushoto (2), Meru, Hathuta River (1), Nderema (1). **Uganda:** Bwamba Forest (1), Uluguru Mts., Bunduki, 1000 ft (1). **Ivory Coast:** Lamto (1). **Not traced:** Mt. Tonkovi (1).

**REMARKS.** Only one of the three male syntypes on which Warren's description is based was traced in BMNH; this specimen is designated as lectotype above.

**107a. *Chiasmia simplicilinea pagenstecheri* (Herbulot, 1978) comb. n.**

not illustrated

[*Macaria trigonata* Pagenstecher, 1907: 95. Holotype ♀. **Comoros:** Anjouan (not traced in ZMHB) [not examined]. Preoccupied name.]

*Semiothisa trigonata* (Pagenstecher); Herbulot, 1956: 249.

*Semiothisa simplicilinea trigonata* (Pagenstecher); Herbulot, 1964: 254.

*Semiothisa simplicilinea pagenstecheri* Herbulot, 1978: 161. Replacement name for *Macaria trigonata* Pagenstecher, 1907.

*Semiothisa simplicilinea pagenstecheri* Herbulot; Herbulot, 1980: 272.

**DIAGNOSIS.** Adult. Smaller (fore wing length 14–16 mm (♂)) than nominotypical subspecies and with postmedian area of both wings more evenly olivaceous. Melanistic specimens are also known.

**DISTRIBUTION.** Madagascar and Comoro Islands.

**MATERIAL.** 19♂ and 13♀. 20 London (BMNH), 12 Paris (MNHN).

**LOCALITIES.** **Madagascar:** Manjakatombo (3), Tsimbazaza, Tananarivo (6), Diego Suarez (13), Mananjary (1), Mananjara (4), Isaka Forest nr. Fort Dauphin (1), C., Maroantsetra (1). **Comoros:** Grande Comore, 4–5 km E. of Nioumbadjou, Bandalamadji, 640 m (1), piste Capitaine Dubois between Boboni and M'Lima Manda, Djadjou, 800 m (2).

**108. *Chiasmia affinis* (Warren, 1902) comb. n.**

Figs 379, 380; 688, 908

*Acadra affinis* Warren, 1902: 527. Holotype ♂. [**?Uganda:**] Usoga, Kayanga, 7.III.[18]99 (Dr Ansorge); ix.527/*Acadra affinis* Warr. ♂ type; Type; Rothschild Bequest B.M. 1939–1 (BMNH) [examined].

*Semiothisa affinis* (Warren); Fletcher, 1963: 24.

**FORE WING LENGTH.** 17 mm (♂), 18 mm (♀).

**ADULT** (Figs 379, 380). Shape of wings and size as in *C. simplicilinea*. Ground colour of wings chalk white, dusted with grey-brown, postmedian area nearly wholly suffused with that colour. Apex of fore wing distal of postmedian marked with orange. All three lines on fore wing well developed, oblique, acutely angled below costa. Hind wing with median and postmedian line well developed. Discal spots small, round, not conspicuous. Underside white with irregular dark irroration, lines well developed. Postmedian area brown with whitish blotches along termen; apical region with a large orange patch. Thorax and abdomen light grey-brown on dorsal side, more whitish on ventral side. Hind tibia of ♂ dilated. Setal comb on A3 present.

**MALE GENITALIA** (Fig. 688). Uncus horns long and slender; gnathos band-like. Costa of valve slightly curved, ventral process developed to form a spatula. Valvula indicated by small, elliptical sclerotization. Sacculus rather narrow, pointed. Aedeagus large and stout, spindle-shaped; vesica bearing a single massive median cornutus. Octavals somewhat w-shaped, with rounded, well sclerotized tips.

**FEMALE GENITALIA** (Fig. 908). Papillae anales medium-sized. Apophyses posteriores long and slender, a. anteriores markedly stouter, about half as long. Operculum large and dome-shaped. Antrum well developed, widest posteriorly. Bursa copulatrix tubular; ductus bursae long and wide, sclerotized and ribbed posteriorly; corpus elliptical, exhibiting a very large, slightly elliptical signum.

**DIAGNOSIS.** Similar to the following two species. 109. *C. fulvisparsa* and 110. *C. fulvimargo*. The last species, however, can be recognized by the very poorly developed basal and median lines, while in *C. fulvisparsa* the lines are heavier than in *affinis*. In the male genitalia, the best diagnostic characters are offered by the octavals and structure of the aedeagus. In the female, the shape of the bursa copulatrix and the operculum are diagnostic.

**BIOLOGY.** Label data suggest an association with tropical forest. Adults have been collected in April (Angola) and December (Sudan).

**DISTRIBUTION.** West (French Guinea, Ghana, Daho-

mey, Cameroon, Angola), Central (Congo Republic, Zaire) and East Africa (Sudan, Uganda, Kenya). Apparently a rare species, known from rather few localities.

**MATERIAL.** 25♂ (1 dissected, slide SAM 31A17) and 8♀ (1 dissected, Geometridae genitalia slide No. 16105) (BMNH). 18 London (BMNH), 1 Paris (MNHN), 1 Cape Town (SAM), 13 Nairobi (NMKE).

**LOCALITIES.** **Uganda:** no further data (1), Kalinzu Forest, Ankole (1), Bwamba (5), Budongo Forest (1), Mabira Forest, Jinja (1), Bundibugyo, Bwamba (2).

**Kenya:** Kakamega Forest (3). **Sudan:** S., Tembura (1). **Ghana:** Coomassie, Friapere Forest (1). **Angola:**

Fazenda Congulu, Amboim district, 7–800 m (8), Quicolungo, 120 km N. Lucala, 800 m (2). **Zaire:** Sankuru, Katako-Kombe (2), Kibali-Ituri: Nioka (2). **Cameroon:** Batouri District, Gadji, 750 m (1), Bitye (1). **Dahomey:** no further data (1).

#### 109. *Chiasmia fulvisparsa* (Warren, 1897)

comb. n.

Figs 381, 382; 689, 909

*Acadra fulvisparsa* Warren, 1897a: 104. Holotype ♀, [Nigeria]: Warri, Niger, CP, vi.[18]96 (Dr Roth); 1897 p. 104/*Acadra fulvisparsa* Warr. ♀ type; Type; Rothschild Bequest B.M. 1939–1 (BMNH) [examined].

*Semiothisa fulvisparsa* (Warren); Swinhoe, 1904: 510; Herbulet, 1954b: 325.

**FORE WING LENGTH.** 16 mm (♂), 17 mm (♀).

**ADULT** (Figs 381, 382). Very similar to *C. affinis*, above, but slightly smaller and darker, with lines more heavily marked. For a detailed description, see under that species. Hind tibia of ♂ dilated, bearing hair-pencil. Setal comb on A3 present.

**MALE GENITALIA** (Fig. 689). Uncus horns slightly shorter than in preceding species; gnathos normally developed. Costa of valve straight, without ventral process. Valvula with small elliptical sclerotization. Sacculus about twice width of costa, squarish. Aedeagus long and cylindrical; vesica bearing a very small median cornutus. Octavals large, furcate.

**FEMALE GENITALIA** (Fig. 909). Papillae anales moderately large, rounded. Both pairs of apophyses delicate and rather short, a. anteriores about half length of a. posteriores. Sterigma not modified. Antrum shell-shaped. Bursa copulatrix resembling a long, entirely membranous tube. Signum medium-sized, elliptical.

**DIAGNOSIS.** See diagnosis under *Chiasmia affinis*, above.

**BIOLOGY.** The species is associated with tropical forests. Adults have been collected in June and September.

**DISTRIBUTION.** Known from West (Cameroon, Nigeria, Ivory Coast, Ghana, Liberia), Central (Zaire, Congo Republic, Central African Republic), and East Africa (Uganda, Kenya, Tanzania).

**MATERIAL.** 26♂ (1 dissected, genitalia slide L 671 (NMBZ)) and 6♀ (1 dissected, genitalia slide L 672 (NMBZ)). 16 London (BMNH), 14 Nairobi (NMKE), 2 Bulawayo (NMBZ).

**LOCALITIES.** **Nigeria:** S., Ilesha (2). **Cameroon:** Lomié (1), Bitye, Ja River (6). **Tanzania:** Usambara, Magamba Forest (1). **Uganda:** Mabira Forest, Jinja (2), Kayonza Forest, Isasha Gorge, 4500 ft (2), Bwamba (2). Bugoma Forest, Unyoro (1), Budongo Forest, Unyoro (1), Entebbe (1). **Kenya:** Kaimosi (1). **Zaire:** Sankuru, Katako-Kombe (1). **Liberia:** Grassfield, Nimba (4). **Ivory Coast:** Bingerville (3). **Ghana:** C., Ashanti, Juaso, 900 ft (1), Bayota Forest, Gagnoa (1), Wassaw Distr., 45 m inland from Sekondi (1), no further data (1).

#### 110. *Chiasmia fulvimargo* (Warren, 1899)

comb. n.

Figs 383, 384; 690, 910

*Semiothisa fulvimargo* Warren, 1899b: 309. Holotype ♂, [Uganda]: Unyoro, Kasokwa, 5.x.[18]97 (Dr Ansorge); vi.309/ *Semiothisa fulvimargo* Warr. ♂ Type; Type; Rothschild Bequest B.M. 1939–1 (BMNH) [examined].

*Semiothisa fulvimargo* Warren; Prout, 1932a: 493; Fletcher, 1963: 24.

**FORE WING LENGTH.** 16–19 mm (♂), 17–18 mm (♀).

**ADULT** (Figs 383, 384). Ground colour of wings chalk-white, striated with grey; postmedian area wholly brown-grey. Basal and median lines faint to absent; postmedian line better developed, but still inconspicuous, acutely angled below costa of fore wing. Discal spots large on fore wing, small and inconspicuous on hind wing. Underside similar, but postmedian area profusely mixed with orange. Vestiture of body grey, dorsal side of abdomen with small blackish spots. Hind tibia of ♂ not dilated. Setal comb on A3 present.

**MALE GENITALIA** (Fig. 690). Uncus horns prominent; gnathos as in other members of the group. Costa of valve slender and curved; sacculus triangular and rather small, extended into recurved point. Aedeagus somewhat spindle-shaped; vesica bearing a single, stout, subapical cornutus. Octavals small, w-shaped.

**FEMALE GENITALIA** (Fig. 910). Papillae anales well

developed, pointed. Both pairs of apophyses slender, a. anteriores hardly shorter than a. posteriores. Operculum dome-shaped. Antrum short and cylindrical. Bursa copulatrix pear-shaped; ductus bursae ribbed. Signum very large, slightly elliptical.

**DIAGNOSIS.** Similar to *Chiasmia affinis* and *C. fulvisparsa*, above, but larger and easily recognized by the absence or strong reduction of the basal and median line on the wings.

**BIOLOGY.** The species is associated with tropical forests. Adults have been collected in April and May; the recorded altitudinal range is 300–1750 m.

**DISTRIBUTION.** East and Central Africa, with records from Rwanda, Uganda, Kenya and Zaire.

**MATERIAL.** 52♂ (1 dissected, genitalia slide L 670 (NMBZ)) and 22♀ (1 dissected, TM genitalia slide No. 11177). 15 London (BMNH), 4 Paris (MNHN), 45 Nairobi (NMKE), 1 Pretoria (TM), 1 Bulawayo (NMBZ), 8 C. Herbulot collection.

**LOCALITIES.** **Kenya:** Nairobi (16), Limuru (2), Kakamega (3), Nyeri (1), Karen, Dlalua Forest (5), N. Kavirondo, S. foot & slopes of Mt. Elgon, 51–5800 ft (2), N. Kavirondo, Nasisi Hills, 4800 ft (3), Isiolo (1). **Uganda:** Entebbe, Zika Forest (1), Bumbo Forest, Mbale (18), Namutere Forest, Busia (1), Impenetrable Forest, Kigezi (1), Kalinzu Forest, Ankole (1), Bwamba Toro (3), Bugoma, E. of Lake Albert, 10–1500 ft (1), S. of Mt. Elgon, E. Mbale Distr., 3800 ft (1), S. of Lake George, 32–3400 ft (1), between Seziwa River and Kampala, 3700 ft (1), Mabira Forest, Kyagwe, Mulange (2). **Rwanda:** Butare (3). **Zaire:** Matadi (4), Urundi, Kitega (3).

### 111. *Chiasmia kilimanjarensis* (Holland, 1892) comb. n.

Figs 385–387; 691, 911; 1013

*Gonodela [sic] kilimanjarensis* Holland, 1892: 95. LECTOTYPE ♂, here designated, [Tanzania]: Zanzibar; W.L. Abbott Collector; 125; *Gonodela kilimanjarensis* Holl. Type; Type No. 552 U.S.N.M. (USNM) [abdomen missing] [examined].

*Gonodela [sic] kilimanjarensis* Holland; Butler, 1893: 683; Swinhoe, 1904: 506.

*Gonodela [sic] zombina* Butler, 1893: 683. LECTOTYPE ♂, here designated, [Malawi]: Zomba (Johnston), January 1893, 93–124/*Gonodela [sic] zombina* Butler type (BMNH) [examined]. See also Remarks.

*Gonodela [sic] mundipennis* Warren, 1901: 213. Holotype ♀, **Angola:** Calweha R[iver], 14.VI.[18]98 (Penrice); VIII p. 213/*Gonodela [sic] mundipennis*

Warr. ♀ type; Rothschild Bequest B.M. 1939–1 (BMNH) [examined].

*Gonodela [sic] mundipennis* Warren; Swinhoe, 1904: 583.

*Gonodela [sic] transvisata* Warren, 1904: 479. LECTOTYPE ♂, here designated, **Angola:** N. Bailundu. IX.[19]01 (Pemberton)/30.IX.[19]01; XI.478/*Gonodela [sic] transvisata* Warr. ♂ type; Rothschild Bequest B.M. 1939–1 (BMNH) [examined]. See also Remarks.

*Macaria zombina* (Butler); Hampson, 1910: 468.

*Macaria kilimanjarensis* (Holland); Janse, 1917: 113.

‡*Macaria kilimanjarensis* ab. *mundipennis* (Warren); Janse, 1917: 113.

‡*Macaria kilimanjarensis* ab. *transvisata* (Warren); Janse, 1917: 113.

*Semiothisa kilimanjarensis* (Holland); Janse, 1932: 224 [as synonym of *zombina*].

*Semiothisa zombina* (Butler); Janse, 1932: 224.

‡*Semiothisa zombina* ab. *mundipennis* (Warren); Janse, 1932: 225.

‡*Semiothisa zombina* ab. *transvisata* (Warren); Janse, 1932: 226.

*Semiothisa mundipennis* (Warren); Prout, 1935: 11.

‡*Semiothisa kilimanjarensis* ab. *transvisata* (Warren); Fletcher, 1958a: 138. An incorrect subsequent spelling.

*Gonodela [sic] zombina* Butler; Fletcher, 1958a: 138 (synonymy).

*Gonodela [sic] mundipennis* Warren; Fletcher, 1958a: 138 (synonymy).

**FORE WING LENGTH.** 16–18 mm (♂), 15–19 mm (♀).

**ADULT** (Figs 385–387). Large. Tail on hind wing not pronounced. Ground colour of wings pale purplish-grey with fine darker irroration; postmedian area a nuance darker. All lines very thin; basal and median faint to obsolete, postmedian relatively best developed, acutely angled below costa of fore wing. Discal spots faint to large and well developed. Underside whitish with dense grey striation in basal and median area; postmedian area greyish-brown to orange. Thorax and abdomen concolorous with wings, ochreous to grey. Hind tibia of ♂ somewhat dilated. Setal comb on A3 present. **Variation:** in ab. *mundipennis* the lines are greatly reduced and the dark irroration is less heavy. These specimens also tend to be more ochreous in coloration. Ab. *transvisata* is characterized by thinner scaling, thus appearing more hyaline.

**MALE GENITALIA** (Fig. 691). Uncus horns well developed, rather stout; gnathos band-like. Valves slender. Costa curved, lacking process, but slightly widened midventrally. Sacculus angular, about twice width of costa. Aedeagus elongated, somewhat spindle-shaped and acutely pointed apically. Vesica with a single short

*cornutus* a short distance from tip and exhibiting some subapical striations. Octavals arcuate, with strongly sclerotized tips.

**FEMALE GENITALIA** (Fig. 911). Very elongated. Papillae anales pointed. Both pairs of apophyses moderately slender, a. anteriores more than two-thirds length of a. posteriores. Sterigma: l. antevaginalis broadly crescentic; sclerotizations of l. postvaginalis small. Operculum broadly triangular. Bursa copulatrix shaped like a long, gradually widening tube. Ductus bursae ribbed posteriorly; corpus totally membranous. Signum very prominent, circular.

**EARLY STAGES.** Larva. Fourth instar: (after a colour transparency provided by N.J. Duke). Head dark green, genal area around ocelli marked with very dark brown. Body rather dark green, mixed with brown, and covered throughout with faint, undulating lines. Sides with extensive dark brown maculation around spiracles, most strongly developed on A3–6. Thoracic legs brownish.

**DIAGNOSIS.** A large and grey species of characteristic appearance. The only similar species is 33. *C. nobilitata*, but that species is on average darker, with a more rounded apex to the fore wing and further has the postmedian line on the fore wing less acutely angled (cf. Figs 221, 222 and 385–387).

**BIOLOGY.** This species has a more or less afromontane pattern of distribution, although there are a number of records from other localities. In Zimbabwe, the larva feeds on *Brachystegia spiciformis*. Adults have been collected throughout the year; ab. *mundipennis* is most common from May to October and constitutes the dry season (winter) form, as already suggested by Janse (1932: 225).

**DISTRIBUTION** (Fig. 1013). From Swaziland and the northern Transvaal through Zimbabwe, Malawi, and Zambia, reaching northwards into Tanzania, Urundi and Zaire. Scarcer in West Africa (Angola, southern Cameroon).

**MATERIAL.** 117♂ (3 dissected, TM genitalia slides No. 967, 971, 10869) and 87♀ (1 dissected, TM genitalia slide No. 10870), 31 Munich (ZSBS), 2 Tervuren (MRAC), 56 Pretoria (TM), 7 Cape Town (SAM), 33 Bulawayo (NMBZ), 60 Nairobi (NMKE), 15 N.J. Duke collection.

**LOCALITIES.** **South Africa, Transvaal:** [Northern Province]; Soutpansberg, Farm Oldrieve's, Outlook Est[ate] (5). [Mpumalanga]: Skukuza (1). **Swaziland:** Malolotja (1). **Zimbabwe:** Laurenceville, Vumba (20), Vumba (1), Aberfoyle, Honde Valley (1), Mutare (Umtali) (2), Hubert Young Drive, Kopje View (1), Inyanga (2), Mt. Selinda (6), Sawmills (5), Lomagundi (1), Lowdale (1), Busi Farm, Chippinga (2), Harare (Salisbury) (15), H. Hallam Dam, Harare (1), Christon Bank (2), Bulawayo (1), Lundi (1), Khami,

Matabeleland (1), Mussoorie Farm, Mtorashanga, S. of Banket (2), Marandellas (3), Fort Victoria (1), Victoria Falls (4). **Zambia:** Mpika (1), Livingstone (1), 8 m N. Livingstone (1), Mwinilunga (2), Sakeji School, Mwinilunga (2), Ndola (1), Kitwe (3), Lusaka (1), Abercorn (45), Zambezi Rapids (1), Ikelenge, N. of Mwinilunga (1), Samfya (2). **Malawi:** Chipota Village, Karonga (2), Tuchila-Sombani, 6857 ft, Mt. Mlanje (1). **Namibia:** Kavango, Popa Rapids (1), East Caprivi: Sangwali (1). **Namibia/Angola:** N. Ovampoland (5), Barotseland (1). **Angola:** Pungo Andongo (1), Lunda District, Cuaimbi, 1250 m (1). **Botswana:** Kalahari (1). **Moçambique:** Dondo (1). **Tanzania:** Tanganyika, Njombe (1), Dodoma (1), Mawanga Forest, Songea (12), Mbeya (1), DOA, Nyassaland (20), Kigonsera (8). Madibira (1), Lake Nyassa, Mango, 600 m (1). **[Zaire]:** (Congo), Elisabethville (1). **Urundi:** Usumbura (1). **Cameroon:** S., no further data (1).

**REMARKS.** (i) The original descriptions of *G. transvisata* and *G. zombina* were based on 2 and at least 3 syntypes, respectively. In both cases only a single specimen was located in BMNH; these examples are designated as lectotypes above. (ii) A specimen of *kilimanjarensis* in SMF is determined as ab. *clarissa* Saalmüller. In addition to being infrasubspecific, this name was apparently never published (H. Schröder, *pers. commun.*) and therefore constitutes a manuscript name.

### 13. *Chiasmia rectistriaria*-group

This group consists of three robust species of quite disparate facies: while two (*C. majestica* and *avitusariooides*) resemble each other fairly closely, being yellowish-ochre insects with tailed hind wings and an emarginate fore wing apex (Figs 391–395), adults of the third, *C. rectistriaria*, strongly resemble *C. simplicilinea* above (Figs 388–390). However, the drastic differences observed in genitalia structure necessitate inclusion in the present group. The apomorphy defining the group is the presence of one or two heavily chitinized curved prongs on the aedeagus. Antennae are ciliate in both sexes, slightly thicker in ♂. Although close to *rectistriaria* in genitalia structure, *C. majestica* is separated from all species of *Chiasmia* I have seen by its having an attenuate uncus; the arrangement of setae on the uncus; and the reduction of the gnathos. These differences notwithstanding I have not placed it in a genus of its own as already suggested by Janse (1932: 224). Such a new genus would probably also have to include *avitusariooides*, once the male of that species becomes known.

**MALE GENITALIA** (Figs 692, 693). Uncus horns paired and short and stout or three in number, long and slender and then arising from centre of uncus; gnathos present (*C. rectistriaria*) or absent (*C. majestica*).

Valves broad. Costa massive, curved at one-third from apex, and dilated to form spatula; in *C. rectistriaria* inner margin bearing a sclerotized ridge. Sacculus large, broadly triangular or rounded, with discrete sclerotizations. Aedeagus slender and fusiform or stout, cylindrical and attenuated, bearing a single or double sclerotized prong. Octavals greatly developed, very broad and somewhat pointed.

**FEMALE GENITALIA** (Figs 912–914). Papillae anales normal; apophyses well developed. Sterigma forming intricate sclerotizations; in *C. rectistriaria* these are among the most complicated of any Afrotropical macariine. Antrum relatively small, atypical in structure. Bursa copulatrix elongated, tubular to pyriform; ductus strongly ribbed. Signum rounded.

The *rectistriaria*-group occurs widely throughout the tropical and subtropical parts of the Afrotropical region, including Madagascar, but is largely absent from the drier regions.

## Key to species

- 1 Moths greyish-green, with bold, double, oblique postmedian line (Figs 388–390). ♂ genitalia (Fig. 692) with sacculus roughly triangular; ♀ genitalia (Fig. 912) narrow, with large and intricate sterigma. Widely distributed on African mainland .....  
..... 112. *rectistriaria* (Herrich-Schäffer), p. 216
- Moths ochreous, with fine, straight or concave brown postmedian line (Figs 391–395). ♂ and ♀ genitalia, where known, not as above (Figs 693; 913, 914). One species throughout tropical Africa; one species restricted to Madagascar ..... 2
- 2 (1) Moths whitish-ochre with dense brown irroration; postmedian area of hind wing with dark, circular spot (Figs 394, 395). ♂ unknown. ♀ genitalia (Fig. 914) with relatively small bursa copulatrix; sterigma somewhat crescent-shaped. Madagascar .....  
..... 114. *avitusarioides* (Herbulot), p. 218
- Moths evenly ochreous with very faint irroration; postmedian area of hind wing without dark spot (Figs 391–393). ♂ genitalia (Fig. 693) with ample, rounded sacculus and triangular uncus. ♀ genitalia (Fig. 913) with large bursa copulatrix; sterigma as illustrated. Mostly tropical West and Central Africa, absent from Madagascar .....  
..... 113. *majestica* (Warren), p. 217

### 112. *Chiasmia rectistriaria* (Herrich-Schäffer, 1854) comb. n.

Figs 388–390; 692, 912; 1014

*Acadra rectistriaria* Herrich-Schäffer, 1854: pl.40, Fig. 197. (Holo-)Type: [South Africa]: Natal (not traced in ZMHB or ZSBS and presumed lost) [not examined]. The identity of the species was established from Herrich-Schäffer's illustration.

*Macaria rectistriaria* (Herrich-Schäffer); Guenée, [1858]: 86; Walker, 1861: 920; Hampson, 1910: 467; Janse, 1917: 114.

*Macaria monstraria* Walker, 1861: 940. Holotype ♂, **Sine patria**: 132. *Macaria monstraria* (BMNH) [examined]. **Syn. n.**

*Macaria postvittata* Walker, [1863]: 1646. Holotype ♀, **Sierra Leone**: 1188. Presented by the Rev[eren]d D.F. Morgan; *Macaria postvittata* (BMNH) [examined]. **Syn. n.**

*Semiothisa rectistriaria* (Herrich-Schäffer); Swinhoe, 1904: 508; Aurivillius, 1910: 37; Janse, 1932: 223; Prout, 1932a: 493; Pinhey, 1975: 86; Herbulot, 1981: 224.

*Acadra rectistriaria* Herrich-Schäffer; Fawcett, 1916: 726.

**FORE WING LENGTH.** 15–17 mm (♂), 16–18 mm (♀).

**ADULT** (Figs 388–390). Fore wings rather narrow, hind wing with a prominent tail. Ground colour of wings whitish, striated and dusted with greyish-green. All three lines on fore wing oblique, acutely angled below costa; postmedian by far heaviest, double. Discal spots well developed. Postmedian area with irregular greyish-green markings. Underside lighter, chalk-white, also dusted with greyish-green, but less heavily so. Lines and discal spots slightly less prominent compared with upperside, but still well developed. Postmedian area olivaceous, with extensive whitish blotches. Vestiture of thorax and body ochreous, with extensive dark dusting. Hind tibia of ♂ dilated. Setal comb on A3 present.

**MALE GENITALIA** (Fig. 692). Massive. Uncus horns and gnathos of medium size. Costa of valve short and stout, curved, with apical region forming a distinct spatula. Inner margin of spatula exhibiting a sclerotized, serrated ridge. Sacculus very prominently developed, pointed, bearing a well defined sclerotization (see figure). Juxta large, heavily sclerotized, modified to form a sclerotized, two-pronged ring around aedeagus. Aedeagus long and slender, without cornuti. Octavals large, extending across most of abdomen.

**FEMALE GENITALIA** (Fig. 912). Papillae anales medium-sized. Both pairs of apophyses slender, a. anteriores about two-thirds length of a. posteriores. Sterigma: both lamella antevaginalis and l. postvaginalis well sclerotized and showing complex structure. Antrum cylindrical, rather inconspicuous. Bursa copulatrix taking the shape of an elongated, ribbed, gradually widening tube. Signum well developed, nearly circular.

**DIAGNOSIS.** Similar to 107. *Chiasmia simplicilinea*, above, but more robust and more heavily marked, in particular in regard to the oblique double postmedian line (simple in *simplicilinea*). Unlike in *C. simplicilinea*, no melanistic examples have been observed.

**BIOLOGY.** Occurs in frost-free savanna as well as in subtropical forest. In South Africa, adults have been collected from January to April and in October–December. Occurs in KwaZulu-Natal in coastal dune forests as well as in disturbed riverine forest.

**DISTRIBUTION** (Fig. 1014). Widely distributed in subsaharan Africa from Nigeria southwards. In southern Africa observed mostly along the coast of KwaZulu-Natal and southern Moçambique, and in eastern and central Zimbabwe.

**MATERIAL.** 75♂ (2 dissected, TM genitalia slides No. 975, 10815) and 43♀ (2 dissected, TM genitalia slide No. 10816; genitalia slide M. Krüger No. 26), 10 London (BMNH), 13 Paris (MNHN), 6 Berlin (ZMHB), 4 Munich (ZSBS), 54 Pretoria (TM), 6 Cape Town (SAM), 6 Bulawayo (NMBZ), 6 C. Herbulot collection, 10 N.J. Duke collection, 1 D.M. Kroon collection, 4 H.S. Staude collection.

**LOCALITIES.** **South Africa, Transvaal:** [Gauteng]: Johannesburg (1). **KwaZulu-Natal:** Umhlanga Rocks (1), Durban (14), Pinetown (1), Umdoni Park (1), Magude (1), Ndumu (4), Tongaat (3), Ngora Forest, Mtunzini District (1), Mtubatuba (1), Dukuduku Forest (11), St. Lucia Lake (2), M'fongosi (2), Estcourt (1), Sordwana Bay (1), Umtentweni, Eden Park (3), Sarnia (3), Nyalazi Forest (1). **Swaziland:** Malagwane Hill, Mbabane (1). **Cape Province:** [Eastern Cape]: Port St. John's (2). **Zimbabwe:** Harare (Salisbury) (1), Christon Bank (4), Lowdale (2), Hunyani River (1), Victoria District (2), Aberfoyle, Honde Valley (5). **Zambia:** Mwinilunga (2), Abercorn (1), Kitwe (1). **Moçambique:** Serra Rotanda (1), Maputo (Lourenço Marques) (1), M'gazi/Kombamune (1), Delagoa Bay (7). **Tanzania:** (DOA), no further data (1), Dar-es-Salaam (1), Tabora (1), Ukami Mts., 1200 m (1), Usambara (1), Nguelo, Usambara (2). **Kenya:** Isiolo (2). **Uganda:** Unyoro, Afindo (2), Fovira, Unyoro (1), Mabira Forest (1). **Rwanda:** Rusumo (2). **Ethiopia:** Ouallega (3). **Angola:** Canhoca (1). **Zaire:** (N. Belgian Congo), S. of Uele River (1), Kibara (1), Dungu, Upper Uelle Distr. (5), Lake Kivu, Kadjudju (1). **Nigeria:** Kaduna (1). **Cameroon:** Yaounde to Yoko, 2000 ft (1), Nkolbisson/Yaoundé (1). **Fr. Guinea:** Tondon, Dubreka Distr. (1). **Rio Muni & Fernando Poo:** (Span. Guinea), Benitogebiet (2). **Not traced:** Afr. occ., Bailundu (1).

### 113. *Chiasmia majestica majestica* (Warren, 1901) comb. n.

Figs 391; 693, 913; 1015

*Semiothisa majestica* Warren, 1901: 213. LECTOTYPE ♂, here designated, **Angola:** Longa R[iver], Nov[ember] [18]99 (Penrice); VIII p. 213/*Semi-*

*othisa majestica* Warr. ♂ type; Rothschild Bequest B.M.1939-1 (BMNH) [examined]. Paralectotype: see Remarks.

*Semiothisa majestica* Warren; Swinhoe, 1904: 509; Janse, 1932: 224; Pinhey, 1975: 86.

*Macaria majestica* (Warren); Hampson, 1910: 468; Janse, 1917: 114.

**FORE WING LENGTH.** 16–19 mm (both sexes).

**ADULT** (Fig. 391). A large and robust species. Apex of fore wings emarginate, hind wing with pronounced 'tail'. Ground colour of wings pale yellow, striated with light grey. All three lines brown, angulated on fore wing, but not acutely so. Basal line developed on fore wing only. Postmedian by far most prominent. Discal spots faint. Underside: similar to upperside, but striae coarser. Thorax and abdomen concolorous with wings. Hind tibia of ♂ dilated. Setal comb on A3 present.

**MALE GENITALIA** (Fig. 693). Uncus conspicuously triangular and pointed; two long and thin, bristle-like horns arising from central portion of uncus; a number of smaller enlarged setae also present. Gnathos absent. Costa of valve fused with sacculus over most of its length, with a prominent 'kink' one-fourth from apex. Sacculus very large, well rounded, distal margin with some conspicuous sclerotizations. Juxta strongly sclerotized, two-pronged. Aedeagus cylindrical, tip acutely pointed; vesica without cornuti. Octavals taking the shape of two large, square plates, separated by a deep emargination.

**FEMALE GENITALIA** (Fig. 913). Papillae anales medium-sized. Apophyses posteriores long and thin, a. anteriores more robust, about half length of former. Sterigma with complicated structure (see figure). Ductus bursae long and fairly wide, strongly ribbed; corpus bursae rounded, signum moderately large, with about 12 spicula.

**DIAGNOSIS.** A very characteristically marked species, unlikely to be confused with other taxa. Another species with emarginate fore wings and a similar line pattern is 166. *C. getula*, below. However, *getula*, although variable in coloration, is always darker and has no 'tail' on the hind wing.

**BIOLOGY.** Apparently a rather scarce, predominantly tropical species. Adults have been collected in February, October and November.

**DISTRIBUTION** (Fig. 1015). Locally in southern Angola, Zimbabwe, Moçambique, Zambia, Malawi and Zaire. The examples seen from Upper Volta and French Guinea appear to belong to *C. majestica majestica*, although the species is represented in west Africa mostly by ssp. *tropica* (Prout).

MATERIAL. 24♂ (1 dissected, TM genitalia slide No. 10975) and 12♀ (1 dissected, TM genitalia slide No. 10855). 5 London (BMNH), 5 Paris (MNHN), 4 Berlin (ZMHB), 1 Munich (ZSBS), 2 Tervuren (MRAC), 3 Pretoria (TM), 1 Cape Town (SAM), 13 Bulawayo (NMBZ), 2 N.J. Duke collection.

LOCALITIES. **Namibia/Angola:** Ovamboland (1). **Zimbabwe:** Vumba Mts (1), Birchenough Bridge (1), Marandellas (1), Mt. Selinda (1), Matetsi (1), Busi Farm, Chippinga (1). **Zambia:** Kitwe (1), Ndola (1). **Moçambique:** Chiluvo Hills (5) (transitional to ssp. *tropica*), 40 m SE. Inhaminga (1), Amatonga Forest (1), Dondo Forest (2), no further data (1). **Malawi:** Bvumbwe (1), Nyasaland, Mt. Mlanje (3), Mlanje, Luchenza R[iver] (1). **[Zaire]:** (Congo), Elisabethville (1), Zilo, Katanga (1), Lulua, Kapanga (1). **Upper Volta:** Bobo (1). **French Guinea:** no further data (3). **Not traced:** Reserve de Bouma (1), Neu-Kamerun, Busamtere (1), Bogeru b. Puma (1), N. Nyassa-See, Neu Helgoland (1), Adamaua (1).

REMARKS. The ♀ syntype mentioned in Warren's original description could not be traced in BMNH.

### 113a. *Chiasmia majestica tropica* (Prout, 1915) comb. n.

Figs 392, 393

*Macaria majestica tropica* Prout, 1915a: 353. Holotype ♂, [Ghana]: Gold Coast, Gambaga (Dr Bury); NZ XXII p. 353/*Macaria majestica tropica* Prout ♂ type; Rothschild Bequest B.M. 1939-1 (BMNH) [examined].

DIAGNOSIS. ADULT (Figs 392, 393). This subspecies is usually darker on the upperside, particularly in postmedian area, which may develop brown maculae. It is further characterized by the presence of ochreous-grey striae and always has a broad brown postmedian band on the underside; this is much narrower in nominotypical specimens.

DISTRIBUTION. West Africa (Senegal to Cameroon).

MATERIAL. 10♂ and 6♀. 6 London (BMNH), 5 Munich (ZSBS), 5 C. Herbuleot collection.

LOCALITIES. **Nigeria:** Kaduna (5); N., Zungeru (2). **Senegal:** Sédiou (2). **Ghana:** Gambaga (2). **Cameroon:** Banda, 520 m, Ngaoundéré-Garoua road at km 116 (3), Yala Yarna, 40 km N. Ngaoundéré, 1150 m (2).

### 114. *Chiasmia avitusariooides* (Herbulot, 1956) comb. n.

Figs 394, 395; 914

*Semiothisa avitusariooides* Herbulot, 1956: 259. Holotype ♀, Madagascar: Périer, Analamazaotra, 11.-19.iii.1955 (C. Herbulot); Type; *Semiothisa avitusariooides* Hrblt. (C. Herbulot collection) [examined].

FORE WING LENGTH. 16–17 mm (♀).

ADULT ♀(Figs 394, 395). Apex of fore wing strongly emarginate; hind wing with a pronounced tail; termen otherwise crenulated. Wings whitish, dusted with brown, particularly in basal two-thirds. Basal and median lines faint. Postmedian well developed, convex, double on hind wing. Discal spots absent. Postmedian area of hind wing with a round brownish spot. Underside: brown postmedian line wider, extending to form a fascia. Vestiture of thorax and abdomen concolorous with wings.

FEMALE GENITALIA (Fig. 914). Papillae anales well developed. Both pairs of apophyses relatively stout, a. anteriores approximately half length of a. posteriores. Sterigma: l. postvaginalis forming a boat-shaped sclerotization. Operculum tear-shaped, antrum very short. Bursa copulatrix fairly small, pyriform; bursa wall ribbed ductus. Signum small, with very short spicula.

DIAGNOSIS. Rather similar to *Chiasmia majestica*, and particularly its ssp. *tropica* Prout, but the differences in female genitalia structure is evident from the illustrations (compare Figs 913, 914). Furthermore, the two species are allopatric, *C. avitusariooides* being endemic on Madagascar.

BIOLOGY. The few known specimens were collected in December–January and March–April, mostly in rain forests. The recorded altitudinal range is 100–1180 m.

DISTRIBUTION. Central and eastern parts of Madagascar.

MATERIAL. 6♀ (1 dissected, Geometridae genitalia slide No. 16937) (BMNH). 1 London (BMNH), 5 Paris (MNHN).

LOCALITIES. **Madagascar:** E., Sambava Distr., Marojejy, Ambinanitelo, 500 m (2), E., Maroantsetra Distr., Farankaraina Forestry Station, Navana road at km 16.5, Antoroka valley, 100 m (1), E., Baie d'Antongil, Hiarakaka, 570 m (1), Antanadahibe, 590 m, SS Préf. Vatomandry (1), Sahambavy near Fianarantsoa, 1010–1180 m (1).

### 14. *Chiasmia multistrigata*-group

A small group of three species, which, with their bark-like wing pattern, are reminiscent of many Boarmiini. They are inhabitants of frequently rather dry savanna; two species occur in southern Africa, while the third appears to be a faunal element particular to the

Sahel. These species form the sister-group of the *C. curvifascia*-group, below. They are characterized by two synapomorphies of the male genitalia, namely the short, baton-like sacculus and the shallow, somewhat angular octavals, whose distal margin is covered with short hairs.

**MALE GENITALIA** (Figs 694–696). Very similar in all three species. Uncus horns well developed; gnathos of normal *Chiasmia* type. Costa of valve long, faintly recurved and lacking ventral process. Sacculus widely separated from costa, baton-shaped, with serrated outer margin. Saccus scarcely protruding from valvae. Aedeagus cylindrical; vesica bearing groups of denticles but no true cornuti. Octavals with very shallow emargination, distal margin setose.

**FEMALE GENITALIA** (Figs 915–917). Characterized by the large, elongated antrum with conspicuous lateral sclerotizations of sterigma; bursa copulatrix rather irregular in shape; signum large and circular.

## Key to species

- 1 Small moths (fw length 11–13 mm), marked entirely in grey (Figs 401, 402). ♂ genitalia (Fig. 696) with rather rounded octavals. ♀ genitalia (Fig. 917) with posterior margin of antrum slightly concave. Restricted to Namibia .... 117. *zobrysi* sp. n., p. 221
- Small to medium-sized moths (fw length 10–16 mm), greyish-brown (Figs 396–400). ♂ genitalia (Figs 694, 695) with squarish octavals. ♀ genitalia (Figs 915, 916) with posterior margin of antrum convex. One species restricted to West Africa, the other widely distributed in southern Africa, with a smaller subspecies in Namibia ..... 2
- 2(1) Small moths (fw length 10–11 mm) (Figs 399, 400). ♂ genitalia (Fig. 695) with apex of sacculus rounded. ♀ genitalia (Fig. 916) as illustrated, antrum relatively short. Cameroon, Upper Volta ..... 116. *improcera* (Herbulot), p. 221
- Small to medium-sized (fw length 10–16 mm), rather variable moths (Figs 396–398). ♂ genitalia (Fig. 694) with truncated sacculus. ♀ genitalia (Fig. 915) as illustrated, with long antrum. Two subspecies, occurring mainly in southern Africa, reaching Kenya in the north .... 115. *multistrigata* (Warren), p. 219

### 115. *Chiasmia multistrigata multistrigata* (Warren, 1897) comb. n.

Figs 396, 397; 694, 915; 1016

*Gonodela* [sic] *multistrigata* Warren, 1897a: 108.  
LECTOTYPE ♂, here designated, [South Africa, KwaZulu-Natal]: Weenen, Natal; IV.108/Gonodela [sic] *multistrigata* Warr. ♂ Type; Rothschild Bequest B.M. 1939–1 (BMNH) [examined, abdomen miss-

ing]. Paralectotype (1 ♂). [South Africa, KwaZulu-Natal]: same data as holotype (BMNH) [examined]. See also Remarks.

*Macaria uultistrigata* (Warren); Janse, 1917: 114.  
*Semiothisa multistrigata* (Warren); Janse, 1932: 233.

**FORE WING LENGTH.** 13–15 mm (♂), 12–16 mm (♀).

**ADULT** (Figs 396, 397). Medium-sized and rather variable in coloration. In general facies, the species approaches bark-resting members of Boarmiini. Ground colour of wings whitish, densely irrorated and striated with brown; postmedian area usually darker, with darker maculae in some specimens. Basal and median line poorly to moderately well developed; postmedian line well developed, undulating. Discal spots rather large but not conspicuous. Underside cream-white, irregularly striated with brown in basal and median areas. Discal spots mostly prominent. Postmedian area brown with whitish blotches along termen. Thorax and abdomen greyish brown on upperside, lighter on underside. Hind tibia of ♂ dilated. Setal comb on A3 present.

**MALE GENITALIA** (Fig. 694). Uncus horns large; gnathos normally developed. Costa of valve long, slightly recurved, not dilated apically and lacking ventral process. Sacculus small and narrow, baton-shaped. Aedeagus elongated, roughly cylindrical; vesica bearing a subapical group of microcornuti. Octavals not conspicuous and rectangular, distal margin hardly emarginate, hairy.

**FEMALE GENITALIA** (Fig. 915). Papillae anales medium-sized, pointed. Both pairs of apophyses strong; a. anteriores about two-thirds length of a. posteriores. Sterigma: l. antevaginalis not developed; l. postvaginalis forming prominent sclerotizations on sides of ostium. Antrum very long, rather slender. Bursa copulatrix irregularly pyriform, wall ribbed; signum very large, circular, situated near centre of corpus.

**EARLY STAGES.** Egg: light green, length 0.6 mm, width 0.38 mm. Shape and sculpture typical of the genus. No darkening was observed prior to hatching of larva. Larva. First instar: length 1.25 mm, width 0.2 mm. Head: width 0.25 mm, light brown, ocelli darker. Body: T1–A1 and A5–6 light yellowish-green, A2–4 darker green; without pattern. Thoracic legs and prolegs concolorous with body. Descriptions of further developmental stages are not available.

**DIAGNOSIS.** The bark-like wing pattern is characteristic. *Chiasmia improcera*, below, may resemble small, pale specimens of *C. multistrigata*, but may be identified by the presence of a broad, whitish fascia on the fore wings between median and postmedian line. In addition, *improcera* is limited to west Africa, while *C. uultistrigata* is largely restricted to the southern parts of the continent. The differences in the genitalia are described under *C. improcera*, below.

**BIOLOGY.** Predominantly a savanna species, but also occurring in subtropical forests in KwaZulu-Natal. Adults have been collected from January to May and again from September to December.

**DISTRIBUTION** (Fig. 1016). The nominate subspecies is predominantly southern African in distribution, occurring commonly in Transkei and Transvaal and KwaZulu-Natal provinces, while being more localized in Cape Province and Zimbabwe. Rarer in Tanzania and Kenya.

**MATERIAL.** 137♂ (5 dissected, TM genitalia slides No. 973, 10828, 10909, 11099, 11111) and 156♀ (2 dissected, TM genitalia slides No. 10829, 11100). 4 London (BMNH), 1 Munich (ZSBS), 4 Bulawayo (NMBZ), 238 Pretoria (TM), 15 Pretoria (SANC), 4 Cape Town (SAM), 14 N.J. Duke collection, 13 H.S. Staude collection.

**LOCALITIES.** **South Africa, Transvaal:** [Gauteng]: Johannesburg (3), Suikerbosrand Nature Reserve (7), Pretoria (47), Farm Kiepersol, Pretoria Distr. (1), Silverton (1), Magaliesberg (10), Zoutpan/Pretoria (2), Renosterpoort, Bronkhorstspruit District (2), Hartebeespoort Dam, Brits District (1). [Northern Province]: Groenvlei (1), Lekkerwater (1), Waterberg (1), Lapalala (2), Mabalingwe (4), Duiwelskloof (1), Potgietersrus (1), Percy Fyfe Nature Reserve, Potgietersrus District (9), Limburg, Potgietersrus District (5), Rooiberg (2), Malta, Ptbg. (1), Ohrigstad (1), Nylstroom (3), Donkerpoort/Nylstroom (1), Blyde River Canyon (1), Three Sisters (1), Kampersrus (2), Satara (4), Louis Trichardt (2), Mmabolela (11), Onverwacht/Ellisras (1), Warmbad (1), Chuniespoort (1), Gladde Klipkop (1), Waterval/Pietersburg (1), Malati Park (1), Mosdene Farm, SE. Naboomspruit (2), Woodbush (2). [North-West]: Buffelspoort (2), Rustenburg Nature Reserve (94), Gloster Game Farm (3), [Mpumalanga]: Ngodwana (2), Laersdrif, Middelburg District (1), Middelburg (1), Berlin Forestry (2), Pullen Farm, Krokodilpoort Mts (16), Skukuza (1), Nelshoogte Forestry, Barberton District (18), Fourteen Streams/Barberton (10), Waterval Onder (4), Waterval Boven (1), Bushman's Rock (1), Kranspoort (1), Zusterstroom (1). Not traced: Griffin Mine (2), Pleisieskloof Onder (1). **Free State:** Farm Abel 52, Parys Distr. (1). **KwaZulu-Natal:** Ndumu (5), Little Switzerland, Drakensberg (1), St. Lucia (2), Dukuduku Forest (2), Nyalazi River (1), Winklespruit (1), Magude (2), Muden (4), Eshowe (1), M'bazwaan Forest, Ubombo District (9), Sihangwana Forest (2), Mboma (1), Umdoni Park (1), Krantzkloof (2), Jozini Dam, Lebombo Mts (3), Mkuse (1), Mkuzi Game Reserve (1), Kulene, Hluhluwe (1), Pietermaritzburg (1), Umgababa (1), Ladysmith (3), Mhlosiinga, Hlabisa District (2), M'fongosi (1). **Cape Province:** [Eastern Cape]: Kei Cuttings (2), Kei Bridge (1), Grahamstown

(1), Port St. John's (3), Umtata (14), The Haven (2), Panza (2), Emjanyana (3). [Western Cape]: Simonstown (1). **Zimbabwe:** Bulawayo (1), Umgusa Forest, Sawmills (1), Hot Springs (2), Christon Bank (2), Mazvidakei Dam, Banket (1). **Kenya:** Suna, S. Kavirondo (4). **Tanzania:** Mbeya (1), Madibira (1).

**REMARKS.** The description of *Gonodela multistrigata* is based on six syntypes of both sexes. Of these, two males only, designated as lecto- and paralectotype above, could be traced in BMNH.

### 115a. *Chiasmia multistrigata liliput* subsp. n.

Figs 398; 1016

**TYPE MATERIAL.** Holotype ♂, [Namibia]: Katima Mulilo, E[ast] Caprivi, 20.–28.X.1970 (A. Strydom); TM Lep[idoptera] Het[erocera] Genitalia slide No. 11097 (TM). Paratypes (23♂, 36♀). **Namibia:** 2♂, 4♀, same data as holotype, TM Lep. Het. Genitalia slide No. 11098; 3♂, 1♀, Diyona Camp, Okavango, 12.II.1956 (de Winter & Marais); 1♂, Abachaus, 2.1942 (G. Meyer); 2♀, *ibidem*, dated Dec[ember] 1942 (G. Meyer); 1♀, Windhoek, III.1959 (B. de Winter); 1♀, Mashare, c.17°54'S 20°09'E, 7.III.1978 (J.B. Ball); 1♂, *ibidem*, dated 14.III.1978 (J.B. Ball); 3♂, 3♀, Tsumeb, dated 21.XII.1939 (G. Meyer) (♂), 12.–14.I.[19]48, genitalia slides No. W7, 8 [F. Gaerdes]; 1♂, Omurumba, Omatuko, 30.XII.[19]49 [F. Gaerdes]; 1♀, Schambrora, Okavango, 23.XII.[19]54 [F. Gaerdes]; Rundu, Okavango, 3.XI.[19]39 [G. Hobohm]; W[est] Okavango, 25.IX.[19]55 [G. Hobohm]; 1♀, Valencia Farm, Rehoboth Distr[ict], 7.–17.V.1965 (J.H. Potgieter); 1♀, Runtu, Okavango, 8.II.1956 (B. de Winter); 1♀, Grootfontein, 28.I.1972 (D.H. Jacobs), TM Lep. Het. Genitalia slide No. 11092 (all TM); 1♂, 1♀, Kavango, Popa Rapids, 18°07'S 21°35'E, 1000 m, 27.II.–02.III.1992 (R. Oberprieler); 1♀, S[outh] W[est] Africa, Otjoscogombe, Waterberg, 1600 m, 5. Nov[ember] 1933 (Dr K. Jordan); 2♂, Oshivello, 28.III.[19]77 (N.J. Duke). **Botswana:** 1♂, 1♀, 32 km S. Kang, 22.–24.I.1978 (M.J. Scoble); 1♂, 16 km NE. Maun, 16.–18.I.1978 (M.J. Scoble); 1♂, Maun, N. Botswana, 21.III.1981 (N.J. Duke); 3♀, *ibidem*, dated 26.III.[19]81; 4♀, *ibidem*, dated 27.III.[19]81; Type number T 747 (SMWN); 1♂, 1♀, 4-Riv[er] Camp, 1903'S 23°10'E, Okavango, Botswana, 8.XII.1973 Nat[ional] Mus[eum] Bulawayo (Pinhey-Fal[con] College Exp[edition], slide L 653 (♂), L 654 (♀) (NMBZ); 2♂, Tsodilo Hills, 2.IV.[19]81 (N.J. Duke) (BMNH, TM, NMBZ, SMWN, N.J. Duke collection).

**FORE WING LENGTH.** 10–12 mm (♂), 11–12 mm (♀).

**DIAGNOSIS: ADULT** (Fig. 398). Similar to nominate subspecies but markedly smaller and frequently lighter

in coloration, with weaker markings. The moths are also similar to small examples of *Chiasmia zobrysi* and *Chiasmia improcera*, below. From the former they may be distinguished by the wing colour which always contains some brown (but is pure grey in *zobrysi*). From the latter it may be separated by the absence of a whitish fascia between the median and postmedian lines. The two species are also clearly allopatric.

**MALE AND FEMALE GENITALIA** (not illustrated). Not distinguishable from the genitalia of the nominate subspecies.

**DISTRIBUTION** (Fig. 1016). Distributed in the more arid parts of the north-western Transvaal, western Zimbabwe, Namibia and Botswana.

**FURTHER MATERIAL.** 24♂, 15♀. 18 Pretoria (TM), 21 Bulawayo (NMBZ).

**LOCALITIES.** **South Africa, Transvaal:** [Northern Province]: Huwi Private Nature Reserve, Ellisras District (1). **Namibia:** Bellerode Farm, Windhoek District (2), Bagani, W. Caprivi (17). **Botswana:** Four River Camp, Okavango (3), Thamalakani River/Maun (2), 32 km S. Maun (1), Mosdene Base Camp, 60 m E. Maun (2), Mohembo-Shakawe, W. Ngamiland (1), Sepopa (2), 30 m NW. Francistown (1), 13 m NW. Kanye on Kang Road (1), 70 m E. Moremi Game Reserve (3). **Zimbabwe:** Wankie (3), Essev Vale (1).

**REMARKS.** *Chiasmia multistrigata* has also been recorded from West Africa (Cameroon); examined: 1♂, Hossé Marba, 9°31'N 13°25'E, 24.-28.XI.1976 (Ph. Darge); M. Krüger genitalia slide No. 6 (coll. C. Herboulot). The only specimen seen is small (forewing length 12 mm) and relatively pale, with a pale median fascia. Until further information about the species' distribution particularly in Angola becomes available, the West African populations cannot be assigned to any subspecies.

### 116. *Chiasmia improcera* (Herbulot, 1987) comb. n.

Figs 399, 400; 695, 916

*Semiothisa improcera* Herbulot, 1987: 284. Holotype ♂, **Cameroon:** Ribao, Hossé Marba, 09°43'N 13°56'E, 2.-10.X.1975 (Ph. Darge); *Semiothisa improcera* Hrblt. Holotype (coll. C. Herboulot) [examined]. Paratypes (5♂, 1♀). 4♂, same data as holotype; 1♂, **Cameroon:** Hossé Marba, 09°31'N 13°25'E, 24.-25.IX.1976, (Ph. Darge); 1♀, **Cameroon:** Sanguéré Sara, 09°12'N 13°30'E, 26.-28.IX.1976 (Ph. Darge) (coll. C. Herboulot) [not examined].

**FORE WING LENGTH.** 10-11 mm (♂).

**ADULT** (Figs 399, 400). Small. Antennae of ♂ finely serrated. Ground colour of wings whitish, densely striated and suffused with greyish brown. Postmedian area wholly greyish brown except for some paler blotches along termen. Median area appearing as a pale, whitish fascia. All three lines and discal spots present but inconspicuous. On underside, contrast between light and darker areas stronger. Costa of fore wing suffused with pale yellow. Median line taking shape of a broad fascia. Body, including all appendages, cream white peppered with dark brown scales. Hind tibia of ♂ dilated. Setal comb present on A3.

**MALE GENITALIA** (Fig. 695). Uncus horns well developed; gnathos deeply emarginate, slender. Costa of valve strong, straight and not dilated apically; no ventral process present. Sacculus baton-shaped, slightly tapering and exhibiting a faint serration. Aedeagus narrow, tapering anteriorly; vesica without cornuti. Octavals squarish with terminal hair-brush, narrow.

**FEMALE GENITALIA** (Fig. 916). Papillae anales fairly small, rounded. Apophyses stout; a. posteriores twice length of a. anteriores. Sterigma with l. postvaginalis forming two large, elliptical sclerotizations on sides of ostium (lost in ♀ examined, but compare Fig. 29 in Herboulot, 1987). Antrum well developed, elongated. Bursa copulatrix pear-shaped; ductus broad and ribbed, its posteriormost part sclerotized. Corpus membranous. Signum large and circular, situated near centre.

**DIAGNOSIS.** Similar to small examples of *Chiasmia multistrigata*, above, but characterized by a broad whitish fascia between median and postmedian lines on the upperside of the wings. In the male genitalia, the species are most easily separated by the shape of the octavals, which are much narrower in *C. improcera*; furthermore, the aedeagus carries some small spines in *multistrigata* which are absent in *improcera*. In the female genitalia, this species is easily identified by the conspicuous sclerotizations of the sterigma.

**BIOLOGY.** According to C. Herboulot (*in litt.*) a typical element of the Sahel. The type specimens were collected in September and October, the ♂ from Burkina Faso mentioned below in August.

**DISTRIBUTION.** West Africa, so far recorded from Cameroon and Burkina Faso.

**MATERIAL.** 1♂ (dissected, genitalia slide No. G 6888) (ZSBS), 1 Munich (ZSBS).

**LOCALITIES.** **Burkina Faso:** (Upper Volta), Bobo (1).

### 117. *Chiasmia zobrysi* sp. n.

Figs 401, 402; 696, 917; 1017

‡*Hyostomodes zobrysi* Prout. **Manuscript name.** See Remarks.

**TYPE MATERIAL.** Holotype ♂, [Namibia]: S.W.A., Windhoek Distr[ict], Farm Valencia 42, 14.–24.IV.1972 (Strydom & Jones) (TM). Paratypes (7♂, 25♀). [Namibia]: 1♂, 4♀, same data as holotype; 1♂, 1♀, Rehoboth District, Farm Valencia, 7.–17.V.1965 (J.H. Potgieter); 1♂, Abachaus, 2.III.1942 (G. Meyer); 1♀, Outjo District, Kamanjab, III.1957 (de Winter & Leistner); 1♀, Windhoek, Farm Ojtisewa, 30.XII.1951 (H. Kinges), genitalia slide No. 10850 (TM); 3♂, 3♀, Okahandja, dated 3.–11.XII.[19]27 (2♀), 1.–12.I.[19]28 (♀), 13.–19.I.[19]28 (8♀), 19.–29.II.[19]28 (1♂, 2♀), Feb[uary] 1935 (F. Gaerdes) (2♀), 26.III.1955 (♂) (genitalia slide No. W5), 26.III.1960 (♂), 2.IX.1960 (♀); 1♂, Waterberg, 13.XII.1935; 2♀, Ojitambi, 30.III.1949 (genitalia slide No. W6) (BMNH, TM, SWMN). Type number T 749 (SMWN).

**FORE WING LENGTH.** 11–13 mm (♂), 12–13 mm (♀).

**ADULT** (Figs 401, 402). Small. Frons with a conspicuous projection. Ground colour of wings whitish, densely irrorated with grey; postmedian area usually somewhat darker grey. All three lines present but inconspicuous, their position marked by dark maculae on fore wing costa. Discal spots also inconspicuous. Underside similar but paler. Thorax and abdomen concolorous with wings. Hind tibia of ♂ not dilated. Seta comb on A3 absent.

**MALE GENITALIA** (Fig. 696). Uncus horns well developed; gnathos of medium proportions. Costa of valve practically straight, slightly dilated apically, without ventral process. Sacculus baton-like as in other members of the group, with a serration along ventral margin. Aedeagus cylindrical, small in relation to remainder of genitalia; vesica with three small median cornuti and a small group of microcornuti below tip. Octavals ranging in shape from w-shaped to furcate, but in all cases relatively small.

**FEMALE GENITALIA** (Fig. 917). Papillae anales somewhat squarish. Both pairs of apophyses fairly strong, a. anteriores two-thirds length of a. posteriores. Sterigma forming two large sclerotizations on sides of the very prominent and elongated antrum. Corpus bursae compact, ductus ribbed, gradually widening into membranous corpus. Signum large, rounded.

**DIAGNOSIS.** Similar to *Chiasmia multistrigata liliput*, above, but separated by its pure grey coloration. All specimens of *C. m. liliput* appear to have at least some brown scales. Also quite similar is 137. *C. punctilinea*, below; however, in that species the postmedian line is more prominent, dissolved into a row of separate spots and more acutely angled below costa of fore wing, while the frontal projection is absent.

**BIOLOGY.** This species inhabits savanna of varying

aridity. Adults have been collected in February–April and December, with most records dating from March.

**DISTRIBUTION** (Fig. 1017). Central and northern parts of Namibia.

**ETYMOLOGY.** The origin of the name chosen by Prout could not be established.

**REMARKS.** In the collection of the Natural History Museum, London, is a series of 1♂ and 15♀ of this species under the manuscript name *zobrysi* Prout. According to the labels, Prout never selected a type. These specimens are here included as paratypes.

## 15. *Chiasmia curvifascia*-group

This group consists of three small to medium-sized species, two of which are also rather like Boarmiini in appearance (Figs 403–407); the third deviates from this pattern in being black and white (Fig. 408). The antennae of the female are ciliate in all species, those of the male bipectinate in two species and ciliate in the third. The group is well defined by several autapomorphies provided by the male genitalia, including shape of the valve, a greatly elongated, cylindrical aedeagus and the long, coiled ductus bursae of the female.

**MALE GENITALIA** (Figs 697–699). Uncus horns well developed, curved; gnathos moderately large. Costa of valve massive, straight or faintly curved and lacking process; sacculus small, pointed, with its inner margin well chitinized. Saccus prominent, forming a tip; this condition is unique to the members of this group. Aedeagus long and slender, more or less cylindrical; vesica bearing a blade-like apical cornutus and, in two species, a shortish, rod-like median cornutus. Octavals ranging in shape from w-shaped to furcate, but in all cases relatively small.

**FEMALE GENITALIA** (Figs 918–920). Papillae anales pointed; apophyses strong. Sterigma with l. antevaginalis not modified; l. postvaginalis forming rounded lateral sclerotizations near ostium. Antrum greatly developed, displaying a conspicuous constriction near connection with membranous ductus. Bursa copulatrix strikingly formed: membranous part of ductus bursae coiled and extending far beyond connection with antrum. Corpus bursae between rounded and elliptical in shape; signum elliptical, with very short spicula.

Two species (*Chiasmia curvifascia* and *C. boarmioides*) are restricted to southern Africa; *C. unifilata* has a wide distribution in the Afrotropical region.

## Key to species

- Small (fw length 11–12 mm), blackish-brown moths with whitish median fascia (Fig. 408); ♂ antennae

- ciliate. ♂ genitalia (Fig. 699) with furcate octavals and comparatively large median cornutus on vesica. ♀ genitalia (Fig. 920) as illustrated, with large signum. Fairly widespread in Afrotropical region .....  
..... 120. *unifilata* (Warren), p. 224
- Medium-sized (fw length 12–14 mm), brown moths with bark-like pattern (Figs 403–407). ♂ antennae bipectinate. ♂ genitalia (Figs 697, 698) with shallower octavals and smaller cornuti on vesica. ♀ genitalia (Figs 918, 919) as illustrated, with relatively smaller signum. Restricted to southern Africa ..... 2
- 2(1) .. Adult as in Figs 405–407. ♂ genitalia (Fig. 698) with short, rod-like median cornutus and semicircular apical cornutus on vesica; octavals moderately deeply excised. ♀ genitalia (Fig. 919) with well developed sterigma .....  
..... 119. *boarmioides* sp. n., p. 223
- Adult as in Figs 403, 404. ♂ genitalia (Fig. 697) with semicircular apical cornutus only; octavals scarcely excised. ♀ genitalia (Fig. 918) lacking sterigma .....  
..... 118. *curvifascia* (Warren), p. 223

### 118. *Chiasmia curvifascia* (Warren, 1897) comb. n.

Figs 403, 404; 697, 918; 1018

*Peridela curvifascia* Warren, 1897a: 110. Holotype ♂, [Zambia]: Mpeta, Loangwa R[iver], affl[uent] of Zamb[ezi], XI, XII [18]95, B[eginning] of rainy s[eason] (Coryndon); Rothschild Bequest B.M. 1939–1; Geometridae genitalia slide No. 9718; *Peridela curvifascia* Warr. ♂ type (BMNH) [examined].

*Boarmia pallidizona* Hampson, 1910: 473. Holotype ♂, [Zimbabwe]: Salisbury, Mashonaland, G.A.K. Marshall 1908–212, Feb[ruary] 1906; *Boarmia pallidizona* Hmpsn. ♂ type (BMNH) [examined]. **Syn. n.** Paratype (1♂). [Zambia]: NE. Rhodesia, East Loangwa Distr[ict], 2400 ft., Petauke. Coll[ected] 25.III.1905 by S.A. Neave. Pres[ented] [19]06 by him and BSA Co[mpany]; 1909–12 (BMNH) [examined].

*Semiothisa pallidizona* (Hampson); Janse, 1932: 234.

FORE WING LENGTH. 12–14 mm (♂), 13 mm (♀).

ADULT (Figs 403, 404). Antennae of ♂ bipectinate. Ground colour of wings ochreous to ochreous grey, irregularly irrorated with blackish brown; postmedian area mummy-brown, with some blackish maculation. Basal and median line present but not well developed, incomplete; postmedian line also not very clear, undulating. Discal spots rather well developed, blackish. Underside ochreous with irregular grey-brown dusting in basal and median area; discal spots prominent. Postmedian area slightly lighter brown than on upperside,

more ochreous towards termen. Vestiture of thorax and abdomen brown mixed with grey, lighter on ventral side. Hind tibia of ♂ not modified. Setal comb on A3 absent.

MALE GENITALIA (Fig. 697). Uncus horns moderately long, curved; gnathos rather delicate. Costa of valve large and curved, faintly dilated apically, without process. Sacculus small and triangular, ending in a blunt tip. Saccus prominent, extended to form a medium-sized tip. Aedeagus cylindrical, strongly elongated. Vesica bearing a semicircular cornutus near apex. Octavals inconspicuous, w-shaped.

FEMALE GENITALIA (Fig. 918). Papillae anales pointed. Apophyses normal, a. anteriores about half length of a. posteriores. Sterigma not modified. Antrum prominently developed and rather broad. Ductus bursae long, characteristically coiled beyond connection with antrum, its inner wall strongly sclerotized. Corpus bursae small, membranous; signum of medium size.

DIAGNOSIS. Similar to 115. *Chiasmia multistrigata*, above (which, however, has simple, not bipectinate, antennae in the ♂) and to *C. boarmioides*, below. While the latter species is usually darker, dissection of the genitalia may become necessary for reliable identification. In *C. curvifascia*, the ♂ has the costa of the valve more slender and lacks the median cornutus present in *C. boarmioides*; the octavals also show some differences (compare Figs 697, 698).

BIOLOGY. Apparently a rare species; the four South African specimens examined were collected in February in a savanna habitat.

DISTRIBUTION (Fig. 1018). Southern and adjoining parts of East Africa, with records from Zambia, Malawi, Moçambique, Zimbabwe, and Transvaal Province in South Africa.

MATERIAL. 5♂ (1 dissected, TM genitalia slide No. 10974) and 7♀ (1 dissected, TM genitalia slide No. 11228). 5 London (BMNH), 4 Pretoria (TM), 3 C. Herbulot collection.

LOCALITIES. **South Africa, Transvaal:** [Northern Province]: Mosdene Farm/Naboomspruit (4).

**Moçambique:** E. of Mt. Mlanje, 2500 ft (2), E. of Mt. Chiperone, 2200 ft (3). **Malawi:** Lilongwe, Capital Hotel (3).

### 119. *Chiasmia boarmioides* sp. n.

Figs 405–407; 698, 919; 1018

TYPE MATERIAL. Holotype ♂, **Zimbabwe:** Bubye River, 19.10.[19]90 (N.J. Duke); TM Lep[idoptera] Het[erocera] Genitalia slide No. 11101 (TM). Paratypes

(9♂, 10♀). **Zimbabwe:** 4♂, 3♀, same data as holotype; TM Lep. Het. Genitalia slide No. 11102; 1♂, 3♀, *ibidem*, dated 24.IV.[19]93; 1♂, Victoria Falls, 12.–20.X.[19]92 (N.J. Duke); 1♀, S[outhern] Rhodesia, Bulawayo, 26.XI.[19]76 (N.J. Duke); 1♂, 1♀, S[outhern] Rhodesia, Salisbury, 18.XII.[19]77 (A.J. Duke); 1♂, 1♀, Doddieburn Ranch, 21°27'S 29°23'E, 3.XII.1985 (♂) and 6.XII.1985 (♀), Nat[jonal] Mus[eum] Bulawayo. **South Africa, Transvaal:** [North-West]: 1♂, 1♀, Buffelspoort, Magaliesberg, 25°45'49"S 27°29'9"E, Riverine Dry Woodland, 10.IX.[19]91 (H.S. Staude) (TM, NMBZ, N.J. Duke collection, H.S. Staude collection).

**FORE WING LENGTH.** 12–13 mm (♂), 12–14 mm (♀).

**ADULT (Figs 405–407).** Antennae of ♂ bipectinate. Wings rather variegated, brown, mixed with grey, somewhat darker in postmedian area, which shows some darker maculation. Lines ranging from very fine and inconspicuous to fairly heavy; more pronounced in ♀. Basal and median line irregular, zigzagging; postmedian line undulating, gently curved towards costa of fore wing. Discal spots well developed but not conspicuous. Underside cream-white, irregularly dusted with greyish-brown; discal spots and median line clear. Postmedian area dark brown, with some whitish blotches along termen. Thorax and body dark brown, mixed with grey, lighter on underside. Hind tibia of ♂ not modified. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 698). Uncus horns stout and curved; gnathos normal. Costa of valve massive, straight. Sacculus small, narrowly triangular. Saccus extended to form distinct tip. Aedeagus long and slender; vesica with a semicircular apical, and a short, needle-like median cornutus. Octavals small and shallow.

**FEMALE GENITALIA** (Fig. 919). Papillae anales large and pointed. Both pairs of apophyses massive, a. anteriores over half length of a. posteriores. Sterigma (l. postvaginalis) forming two large sclerotizations on sides of ostium. Antrum well developed, long. Bursa copulatrix highly characteristic, with membranous ductus extending for a long distance beyond connection with antrum. Corpus small and rounded; signum well developed, slightly elliptical.

**DIAGNOSIS.** Similar to 115. *Chiasmia multistrigata*, above; however, the antennae of males of that species are simple, not bipectinate. In the case of females, dissection of the genitalia may become necessary. The differences in genitalia structure are apparent from the illustrations (compare Figs 915, 919).

**BIOLOGY.** N.J. Duke (*pers. comm.*) found the species to be locally abundant in riverine *Acacia* savanna. Adults have been collected from September to January.

**DISTRIBUTION** (Fig. 1018). Widely distributed in

southern and western Zimbabwe; more localized in the north and east. Zambia and Moçambique. Recently the species was also found in the southern Transvaal.

**FURTHER MATERIAL.** 24♂ (1 dissected, slide L 683 (NMBZ)) and 17♀, 41 Bulawayo (NMBZ).

**LOCALITIES.** **Zimbabwe:** Bulawayo (3), Doddieburn Ranch (5), Devuli R[iver], Sabi Valley (2), Kariba (1), Victoria Falls (5), Wankie (2), Khami, Matabeleland (8), Balla Balla (4), Sinoia (2), Nyamandhlovu (1), Colleen Bawn (1), Lower Sabi, Dots Drift, Chisumbanje (1). **Zambia:** Katambora (4). **Moçambique:** (PEA), Ruenya R[iver], Shangara (1), Chiluvo Hills (1).

**ETYMOLOGY.** From Greek ειδος, form, appearance, and *Boarmia* Treitschke; on account of the external similarity to members of that genus.

## 120. *Chiasmia unifilata* (Warren, 1899) comb. n.

Figs 408; 699, 920; 1018

*Gonodela* [sic] *unifilata* Warren, 1899b: 307. Holotype ♂, [Uganda]: Katagrukwa R[iver], Uny[oro], 21.V.[18]97 (Dr Ansorge); VI p.307/*Gonodela* [sic] *unifilata* Warr. ♂ type; Rothschild Bequest B.M.1939-1 (BMNH) [examined].

*Macaria unifilata* (Warren); Hampson, 1910: 468.

**FORE WING LENGTH.** 11–12 mm (both sexes).

**ADULT (Fig. 408).** Small; general appearance dark. Antennae of ♂ ciliate. Ground colour of wings whitish, profusely dusted and striated with blackish-brown. A broad whitish fascia, encompassing postmedian line present just distal of discal spots. Lines otherwise scarcely discernible. Discal spots inconspicuous due to dark coloration. Postmedian area with a round to elliptical black spot near anal angle of hind wing and slightly below level of discal spot on fore wing. Underside similar to upperside, but paler, the blackish brown replaced by greyish brown. Body concolourous with wings, paler on underside. Hind tibia of ♂ not modified. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 699). Uncus horns rather small; gnathos well developed. Costa of valve massive; sacculus small and triangular, rather acutely pointed. Saccus forming fairly broad tip. Aedeagus long and slender, pointed; apical portion heavily striated. Vesica bearing two fairly massive cornuti (one apical, one median). Octavals small, furcate.

**FEMALE GENITALIA** (Fig. 920). Elongated. Papillae anales well developed. Both pairs of apophyses massive, a. anteriores less than half length of a. posteriores. Sterigma (l. postvaginalis) forming two roundish

sclerotizations on sides of ostium. Antrum prominent, long. Bursa copulatrix as described for the group; signum large, broadly elliptical, situated near centre of corpus.

**DIAGNOSIS.** The very dark brown wings with a whitish median fascia are characteristic.

**BIOLOGY.** In Zimbabwe, adults have been collected in February and March.

**DISTRIBUTION** (Fig. 1018). Occurring over a large part of subsaharan Africa: records exist from Ethiopia, Sudan, Nigeria, Cameroon, Zaire, Zambia, Tanzania and Zimbabwe. The latter constitute a **new record** for southern Africa.

**MATERIAL.** 15♂ (1 dissected, TM genitalia slide No. 11106) and 11♀ (dissected, TM genitalia slide No. 11107), 13 London (BMNH), 2 Nairobi (NMKE), 2 Pretoria (TM), 2 C. Herbulot collection, 7 N.J. Duke collection.

**LOCALITIES.** **Ethiopia:** (Abyssinia), no further data (2). **Sudan:** Tambura, S. Bahr-el-Ghazal (1). **Nigeria:** N., Bauchi Prov., Kabwir (1). **Zaire:** Dungu, Upper Uelle District (1), Elisabethville (4), Katanga, Biano (Ditanto) (1). **Zimbabwe:** Mazoe (4), Harare (Salisbury) (4), Lowdale (2). **Tanzania:** Mpanda (1). **Zambia:** Ndola (1), Mwengwa (1), East Loangwa Dist., 2400 ft., Petauke (1). **Cameroon:** Banda, 520 m., Ngaoundéré-Garoua road at km 116 (2).

## 16. *Chiasmia procidata*-group

This group contains five species of very distinct appearance: the slightly glossy, straw-coloured fore wings are devoid of any lines; a dark terminal shade of varying width is usually present (Figs 409–420). This pattern also provides the most striking apomorphy defining the group, since both male and female genitalia are fairly heterogenous in structure. The antennae bear short to moderately long pectinations in the male; in the female, they are shortly ciliate. The species of the *procidata*-group have a continuous distribution from the Cape Province to Saudi Arabia but are absent from Central and West Africa and Madagascar.

**MALE GENITALIA** (Figs 700–704). Uncus horns rather small; gnathos moderately well to well developed, deeply emarginate. Costa of valve straight or gently curved and somewhat dilated apically; ventral process present or absent. Sacculus varying in shape from small and rounded to medium-sized and pointed. Aedeagus rather short; curved and with acutely pointed tip; vesica bearing one or several small median cornuti and/or some apical striation. Octavals variable, but in the majority of species more or less strongly arcuate.

**FEMALE GENITALIA** (Figs 921–925). Papillae anales

large; apophyses relatively long and slender. Sterigma: l. antevaginalis, if modified, taking the shape of a simple, shield-shaped area of heavier chitinization; l. postvaginalis variable, not modified (*procidata*) to quite elaborate (*pervittata*, *turbulentata*). Antrum well developed, comparatively stout. Bursa copulatrix more or less pear-shaped, with gradual transition from ductus to corpus bursae. Signum absent (*latimarginaria*, *pervittata*), small (*turbulentata*, *warreni*), or large and hour glass-shaped (*procidata*).

## Key to species

- 1 ♂ genitalia (Figs 703, 704) with ventral process on costa. ♀ genitalia as in Figs 924, 925, with very small or reduced signum ..... 2
- ♂ genitalia (Figs 700–702) without ventral process on costa. ♀ genitalia as in Figs 921–923; if signum reduced, then with antrum as in Fig. 923 ..... 3
- 2(1) .. Adult as in Figs 419, 420. ♂ genitalia (Fig. 704) with long sacculus; octavals deeply emarginate. ♀ genitalia (Fig. 925) with rather short bursa copulatrix, lacking signum; sterigma extensive ..... 125. *pervittata* (Hampson), p. 230
- Adult as in Figs 417, 418. ♂ genitalia (Fig. 703) with markedly shorter sacculus; octavals very shallow. ♀ genitalia (Fig. 924) exhibiting longer bursa copulatrix with small, nail-like signum; sterigma small, confined to sides of antrum ..... 124. *warreni* (Prout), p. 230
- 3(1) Small species (fw length 11–14 mm), with strongly developed terminal shade (Figs 414–416). ♂ genitalia (Fig. 702) with very small sacculus and short, spindle-shaped aedeagus. ♀ genitalia (Fig. 923) as illustrated, bursa copulatrix without signum. Northern Africa (Algeria, Chad, Niger); Gulf of Aden to Saudi Arabia and Yemen ..... 123. *latimarginaria* (Rebel), p. 229
- Larger species (fw length 13–17 mm), with moderately well to poorly developed terminal shade (Figs 409–413). ♂ genitalia (Figs 700, 701) with larger sacculus and more elongated aedeagus. ♀ genitalia (Figs 921, 922) with small or well developed signum. Southern Africa to Ethiopia; one species with an endemic ssp. in Saudi Arabia ..... 4
- 4(3) Terminal shade on fore wing mostly well defined with straight inner margin (Fig. 409); underside of hind wing strongly marked (Fig. 410). ♂ genitalia (Fig. 700) with long, pointed sacculus. ♀ genitalia (Fig. 921) with small signum ..... 121. *turbulentata* (Guenée), p. 226
- Terminal shade on fore wing weakly developed with ill-defined inner margin (Figs 411–413); underside of hind wing more weakly marked. ♂ genitalia (Fig. 701) with short, rounded sacculus. ♀ genitalia (Fig. 922) with large, elliptical signum ..... 122. *procidata* (Guenée), p. 227

**121. *Chiasmia turbulentata* (Guenée, [1858])  
comb. n.**

Figs 409, 410; 700, 921; 1019

*Osteodes turbulentata* Guenée, [1858]: 177. Holotype ♀, [South Africa, Western Cape]: Cape (Cap de Bonne-Espérance). [Supposed to be in NHMW (Felder, 1875), but apparently lost (Fletcher, 1978a).]

*Osteodes turbulentata* Guenée; Walker, 1862: 1061; Felder, 1875 (2): Pl.129, Figs. 4, 4a; Hampson, 1910: 467.

*Aspilates exumbrata* Walker, [1863]: 1680. LECTOTYPE ♂, here designated, [South Africa, Western Cape]: Cape Town, Feb[ruary] 1861/61 102; Geometridae genitalia slide No. 9679; *Aspilates exumbrata* Walker Lectotype ♂ det. D.S. Fletcher 1975; *Aspilates exumbrata* (BMNH) [examined]. Fletcher apparently never published his lectotype designation. Paralectotypes (1 ♂, 2 ♀). [South Africa]: 1 ♂, Cape Town, Feb[ruary]? 1861/61 102; *Osteodes procidata* Guenée det. D.S. Fletcher 1975; *Aspilates exumbrata* Walker Paralectotype ♂ det. D.S. Fletcher 1975. 1 ♀, Cape Town, April/61 102; Geometridae genitalia slide No. 9683; *Osteodes procidata* Guenée, det. D.S. Fletcher 1975; *Aspilates exumbrata* Walker Paralectotype ♀ det. D.S. Fletcher 1975. 1 ♀, Cape Town, March 1861/61 102; *Aspilates exumbrata* Walker Paralectotype ♀ det. D.S. Fletcher 1975 (BMNH) [examined]. **Syn. n.**

‡*Osteodes turbulentata* Guenée; Wallengren, 1875: 121; Janse, 1917: 114. Misspelling.

*Osteodes procidata eritreensis* Prout, 1915a: 348. Holotype ♂, [Ethiopia]: (Eritrea), Asmara, 18. Ott[obri] 1905 (N. Beccari); *Osteodes procidata eritreensis* Prout ♂ type; Rothschild Bequest B.M.1939-1; Geometridae genitalia slide No. 9680 (BMNH) [examined]. Paratype (1 ♀). [Ethiopia]: *ibidem* (BMNH) [examined]. Synonymized by Fletcher, 1978a: 78. A second paratype from the same locality, dated 17th of October, was not traced.

*Osteodes procidata* var. *exumbrata* Walker; Aurivillius, 1910: 37.

[*Semiothisa procidata* (Guenée); Janse, 1932: 220; Pinhey, 1975: 86. Misidentification.]

*Aspilates exumbrata* Walker; Fletcher, 1958a: 136 (as synonym of *procidata*).

*Semiothisa turbulentata* (Zeller MS) (Guenée); Fletcher, 1978a: 78.

FORE WING LENGTH. 13–16 mm (♂), 14–16 mm (♀).

ADULT (Figs 409, 410). Fore- and hind wings straw-coloured, glossy. Terminal shade grey, well developed and broad on fore wing; inner margin nearly straight. A prominent straw-coloured apical streak present on fore wing. Hind wing with terminal shade less prominent, occasionally reduced to a submarginal

band, but in most cases with veins whitish. Discal spots absent or very weakly developed. Underside: discal spots more prominent, especially on hind wing. Fore wing markings similar to upperside, but distal part of terminal shade lighter, basal area dusted with grey and area costad of apical streak brown. Hind wing with conspicuous brown irrorations in terminal half, whitish-grey along anal margin, a whitish streak running from wing base to termen, encompassing the black discal spot. Vestiture of body concolourous with wings. Hind tibia of ♂ not modified. Setal comb on A3 absent.

MALE GENITALIA (Fig. 700). Uncus horns moderately long; gnathos fairly broad. Valves elongated. Costa long, slightly curved and not dilated apically, without ventral process. Sacculus large and pointed. Aedeagus relatively small, with pointed apex and truncated anterior end. Vesica bearing one rather small median cornutus and a number of microcornuti. Octavals large, conspicuous, somewhat arrow-shaped.

FEMALE GENITALIA (Fig. 921). Papillae anales large and blunt. Apophyses posteriores slender; a. anteriores stouter, approximately two-thirds length of former. Sterigma complex. Antrum well developed, distal margin pointed. Bursa copulatrix rather stout and pear-shaped, with short, locally sclerotized ductus. Signum small and inconspicuous.

EARLY STAGES (Fig. 6f). Egg: Pale green, length 0.6 mm, width 0.4 mm. Strongly sculptured, of typical *Chiasmia*-shape. Larva. First instar: length 1.4 mm, width 0.2 mm. Head: width 0.3 mm, light brown, ocelli conspicuous. Body yellowish-green, more light brown anteriorly, without markings. Legs concolourous with body. Second instar: length 5 mm, width 0.6 mm. Head: width 0.5 mm, dark brown except for genal and occipital areas; occiput with dark brown stripes. Body: dorsal and lateral areas dark green with wavy lines. One protuberance present on segment A3. Ventral area including legs very dark brown with green intersections reaching down between segments. Third instar: length 8 mm, width 1.0 mm. Head: width 0.9 mm, as in second instar, but genal area slightly lighter. Body: dorsal area dark green, interspersed with yellow and brown; T1 light brown. Lateral area with a greenish-yellow line. Ventral area, including legs, dark brown, interspersed with dark green. Fourth instar: length 22 mm, width 2.0 mm. Head: width 2.2 mm. Ground colour rather dark green, densely spotted with dark brown. Body of fairly light green ground colour, but with very extensive dark brown markings. Dorsal area with broad middle line, two pairs of small, brown, fleshy protuberances per segment, posterior pair larger. Lateral area on T1–A8 with broad, light green line, interrupted by dark brown areas. Ventral area, including all legs, dark brown, one roughly square yellowish spot on each segment. Only one colour form was observed. Pupa: length 11 mm,

width 4 mm, dark brown. Cremaster as in Fig. 6f.

**DIAGNOSIS.** Characterized by the usually very prominent terminal shade, which has a well-defined, straight inner margin, and by the conspicuous, streaked markings on the underside of the hind wings. In the male genitalia, the sacculus is pointed (rounded in *C. procidata*), in addition, *turbulentata* possesses far larger octavals. In the female genitalia, this species is easily recognized by its very small signum. There exists some confusion as to the identity of *turbulentata*; unfortunately Janse (1932), followed by Pinhey (1975), confused *C. turbulentata* and *C. procidata*.

**DISTRIBUTION** (Fig. 1019). Widely distributed in southern Africa, but absent from Botswana and the interior of Cape Province; further north confirmed records are from Malawi and Eritrea.

**BIOLOGY.** A savanna species, which is most abundant on the Transvaal highveld. Adults have been collected throughout the year. I have reared the larvae on *Acacia karroo* Hayne. The species frequently occurs together with *C. procidata*, and both species may form large colonies. In captivity the development from egg to imago was completed in 35 days. Adults have been collected from January to June and again in September–December.

**MATERIAL.** 106♂ (2 dissected, TM genitalia slides No. 984, 10817) and 89♀ (4 dissected, TM genitalia slides No. 10818, 11074, 11075, 11077). 145 Pretoria (TM), 5 Pretoria (SANC), 5 Cape Town (SAM), 22 Bulawayo (NMBZ), 3 Windhoek (SMWN), 5 N.J. Duke collection, 10 H.S. Staude collection.

**LOCALITIES.** **South Africa, Transvaal:** [Gauteng]: Johannesburg, Witkoppen (3), Florida Park/Roodepoort (1), Pretoria (10), Magaliesberg (1), Silverton (2), Donkerhoek (1), Boekenhoutskloof (42), Suikerbosrand Nature Reserve (12). [North-West]: Rustenburg (4), Kalkheuvel (1), Gloster Game Farm (4), Randfontein District (1). [Northern Province]: Koster (1), Nylsvley (1), Malati Park (1), Rooiberg (1), Graaf Reinet (1), Percy Fyfe Nature Reserve, Potgietersrus Distr. (2), Elandshoek (1), Nylstroom (1), Pietersburg (1). [Mpumalanga]: Barberton (3), Waterval Onder (1), Waterval Boven (1), Klipfontein (4). **Free State:** Sasolburg (9), Vredfort Road (1), Oranjekrag, H.F. Verwoerd Dam (3), Smithfield (1). **KwaZulu-Natal:** Estcourt (1), Maput (1), Yellowwoods, Balgowan (1). **Cape Province:** [Northern Cape]: Brakfontein, Richtersveld (1). [Eastern Cape]: Steynsburg (3), Fort Beaufort (1), East London (3), Grahamstown (3), Port Elizabeth (2). [Western Cape]: Swartbergpas (1), Stormsriviermond Coastal National Park (1), Seweweekspoort (2), Willowmore (1), Cape Town (5), Constantiaberg (1). Ambiguous: Klipplaat (9). **Namibia:** South West Africa, no further

data (1), Karasberge, Farm Noachabib (2), Bullspoort (4), Farm Valencia, Rehoboth Distr. (9), Windhoek (1), Farm Valencia 42, Windhoek District (1), Abachaus (1), Okahandja (3). **Zimbabwe:** Mt. Selinda (1), Chirinda Forest (2), Shangani (1), Harare (Salisbury) (8), Bulawayo, Hillside Dam (1), Insiza (2), Mutare Distr. (4), Selukwe (1), Nyamandhlovu (3), Turk Mine (2). **Malawi:** Lilongwe (1).

## 122. *Chiasuia procidata procidata* (Guenée, [1858]) comb. n.

not illustrated

*Osteodes procidata* Guenée, [1858]: 177. Type material: not stated ('Beaucoup d'exemplaires'). LECTOTYPE ♂, here designated, [**Ethiopia**]: 1190.50; *procidata*; Type; Muséum Paris, Abyssinie, Schimper 1850; *Osteodes procidata* Gn. X: 177 (MNHN) [examined]. Paralectotype (1 ♀). [**Ethiopia**]: *procidata*; Allotype; Muséum Paris Abyssinie, Schimper 1850; 1130.50 (MNHN) [examined].

*Osteodes procidata* Guenée; Walker, 1862: 1061; Swinhoe, 1904: 504; Prout, 1932a: 484.

‡*Osteodes catacryspha* Prout. Type ♀. **Uganda:** Kampala, 20.VII.1938 (H. Hargreaves); *Osteodes catacryspha* Prout ♀ type; retain for B.M.; Manuscript Name; Geometridae genitalia slide No. 16946. Manuscript name.

*Semiothisa procidata* (Guenée); Fletcher, 1958a: 136.

**DIAGNOSIS.** Adult. Similar to ssp. *semispurcata*, below, but with terminal shade greatly reduced and further characterized by less contrasting underside markings. For a detailed description see below.

**DISTRIBUTION.** East Africa (Ethiopia to Tanzania); Central Africa (Zaire).

**MATERIAL.** 14♂ and 8♀. 9 London (BMNH), 6 Munich (ZSBS), 1 Nairobi (NMKE), 6 C. Herbulet collection.

**LOCALITIES.** **Ethiopia:** Djem-Djem Forest, 8000 ft (1). **Tanzania:** Tanganyika, Songea, Litembo, 1500 m (6), Bueni nr. Iringa (1), SW., Marungu plateau, W side, 7000 ft (2). **Uganda:** Mbale, Bumbo Forest (1), Namadara Forest, Mbale Distr. (2). **Rwanda:** SE., Rusumo, 1300 m (1), Butare (3). **Kenya:** N. Kavirondo, S. foot & slopes of Mt. Elgon, 51–5800 ft (1), S. Kavirondo, Kisii Distr., 5000 ft (1). **Zaire:** Elisabethville (1). **Angola:** Cubal River (2).

## 122a. *Chiasuia procidata semispurcata* (Walker, [1863]) comb. n.

Figs 411–413; 701, 922; 1020

*Aspilates semispurcata* Walker, [1863]: 1679. Holotype ♀, South Africa/48 70; *Aspilates semispurcata*; Geometridae genitalia slide No. 9684; *Aspilates semispurcata* Walker Holotype ♀ (BMNH) [examined].

*Osteodes procidata* Guenée; Janse, 1917: 114.

[*Semiothisa turbulentata* Guenée; Janse, 1932: 221. Misidentification.]

*Aspilates semispurcata* Walker; Fletcher, 1958a: 136 (synonymy).

FORE WING LENGTH. 13–16 mm (♂), 14–17 mm (♀).

ADULT (Figs 411–413). Fore and hind wings straw-coloured, glossy, slightly paler than in preceding species. Terminal shade well developed to nearly absent on fore wing, its inner margin curved and not well defined on fore wing, weakly developed or absent on hind wing. Apical streak at most weakly developed, usually absent. Discal spots mostly absent. Underside: terminal shade poorly developed, costal and terminal area of fore wing yellowish-grey, basal part greyish. Hind wing yellowish, with an ill-defined, greyish post-median fascia and a fine white streak running from wing base to termen. Discal spots small, black. Vestiture of body concolorous with wings, pale ochreous. Hind tibia of ♂ not modified. Seta comb on A3 absent.

MALE GENITALIA (Fig. 701). Uncus horns short; gnathos normal. Costa elongated and somewhat curved, without ventral process. Sacculus rather small, well rounded. Aedeagus slender, curved and acutely pointed apically; vesica bearing a single crooked median cornutus with rough surface and exhibiting some striations near apex. Octavals of moderate size, broadly arcuate.

FEMALE GENITALIA (Fig. 922). Papillae anales narrow. Both pairs of apophyses moderately stout, a. anteriores between half and two-thirds length of former. Sterigma not modified. Antrum well developed, broadly flute-shaped and well sclerotized. Bursa copulatrix pear-shaped. Ductus bursae short and densely ribbed locally; corpus bursae membranous. Signum large and somewhat hour glass-shaped.

EARLY STAGES. Egg: Green, length 0.6 mm, width 0.45 mm, surface locally smooth. The egg turns blackish prior to hatching. Larva. First instar: length 1.5 mm, width 0.38 mm. Head: width 0.35 mm, light brown, ocelli conspicuous. Body: T1–3 and A4–10 pale yellowish-brown, A1–3 green on dorsal and lateral regions. Ventral aspect, including prolegs, over entire length densely mottled with dark brown; without further markings. Second instar: length 5 mm, width 0.45 mm. Head: width 0.5 mm, coloration as in first instar. Body: lateral area green, dorsal and ventral area, including prolegs, densely marked with wavy brown lines so that ventral area appears dark brown. One pair of dorsal

protuberances on A3. Third instar: length 10 mm, width 1.0 mm. Head: width 1.2 mm, bright green with blackish-brown spots covering occiput and genae. Body: ground colour bright green. Dorsal area with very faint wavy lines. Lateral area whitish green in central part, a faint median line present, but not well defined. Subventral and adventral lines better developed, but also incomplete. Midventral line well developed, blackish brown, but ventral area pure green on A9–10. Fourth instar: length 23 mm, width 1.8 mm. Head: width 1.85 mm, bright green with numerous spots of light and darker brown. Body: about 50% of L4 larvae with ground colour green, the remainder light brown. Dorsal area with darker median line, intersegmental membrane yellowish. Lateral region with a large dark brown area around spiracle. Midlateral line yellowish. Ventral area (green form): pure green with two lighter lines; thoracic legs brown, prolegs green. In brown form, ventral area brown with lighter midventral line; thoracic and prolegs also brown. Larvae of both colour forms turn purplish prior to pupation. Pupa: length 11 mm, width 4 mm, shape as in other members of the genus.

DIAGNOSIS. Similar to 124. *Chiasmia warreni* and also to 125. *C. peruvitata*, below. *C. procidata* can be separated from the former externally by the weaker terminal shade, the inner margin of which is less clearly defined and not straight, and the different markings on the underside of the hind wings. On average, specimens of *C. warreni* are also larger. In the male genitalia, the costa of the valve of *procidata* is simple, whereas a ventral process is present in the two other species. In the female genitalia, *C. procidata* is easily separated from all other species in this group by the very large signum (compare Fig. 925 with Figs 924 and 926–928).

DISTRIBUTION (Fig. 1020). Southern Africa, recorded from Malawi, Zimbabwe, Namibia and South Africa.

BIOLOGY. The species is predominantly an inhabitant of savanna. Most records in South Africa are from the Transvaal highveld; *C. procidata* is markedly rarer in KwaZulu-Natal and the Cape Province. In southern Africa, adults are found from September to May in a succession of generations. In Saudi Arabia, the species has been collected in the adult stage in April. In South Africa, the larva has been reared on *Acacia karroo* by myself and others (Taylor, 1946; 1951; 1953), as well as on *Rhus lanceolata* (Taylor, 1953). The record by Dickson (1944) may be erroneous and refer to *C. turbulentata*.

MATERIAL. 140♂ (6 dissected, TM genitalia slides No. 2711, 10819, 10822; SAM 31A15; slide L 642 (NMBZ); Geometridae genitalia slide No. 16171 (BMNH) and 115♀ (4 dissected, TM genitalia slides No. 10820, 11065, 11076; slide L 643 (NMBZ)). 6 Nairobi (NMKE), 31 Bulawayo (NMBZ), 172 Pretoria (TM), 7 Pretoria (SANC), 3 Cape Town (SAM), 9

C. Herbulot collection, 16 N.J. Duke collection, 11 H.S. Staude collection.

**LOCALITIES.** **South Africa, Transvaal:** [Gauteng]: Johannesburg, Witkoppen (1), Klipriver, Johannesburg (1), Hekpoort/Krugerdsorp (2), Kenmare/Krugerdsorp (3), Krugerdsorp (1), Verwoerdburg, Eldoraigne (1), Pretoria (23), Roodeplaat (1), Mooisplaats near Bronkhorstspruit (3), Suikerbosrand (35), Donkerhoek (2), Silverton (4), Boekenhoutskloof (36). [North-West]: Gloster Game Farm (3), Rustenburg (5). [Northern Province]: Lekkerwater (1), Gladde Klipkop (1), Bon Accord (1), Malta, P[ie]t[ers]b[ur]g (1), Pietersburg (2), Nylstroom (1), Woodbush Village (2), Clouds End Hotel, Zoutpansberg (1), Wyllie's Poort (1), Louis Trichardt (1), Farm Oldreive's, Outlook Estate (7). [Mpumalanga]: Barberton (4), Waterval Onder (1). Not traced: Rooiplaat (1). **Free State:** Sasolburg (5), Oranje krag, HF Verwoerd Dam (2). **KwaZulu-Natal:** Estcourt (1), Weenen (1), Muden (1), Thorny Bush/Pietermaritzburg (1). **Cape Province:** [Western Cape]: Seven Weeks Poort (1), Vanrhynsdorp (2), Oudtshoorn (1), Cape Town (2), Cape District, Kalk Bay (1). [Eastern Cape]: Queenstown (1), Kei Bridge (1), Grahamstown (1), East London (4), The Haven (2), Umtata (8), Port St. John's (18), Umzimvubu River Mouth (1). Ambiguous: Libertas (1). **Namibia:** Abachaus (2). **Zimbabwe:** Laurenceville, Vumba (5), Bunga Forest (1), Chirinda (2), Mt. Selinda (1), Harare (Salisbury) (17), Wingate (1), Bulawayo, Hillside Dam (1), Mutare (Umtali) District (3), Marandellas (2), Penhalonga (1), Bromley (1). **Malawi:** Zomba (1), (Nyassaland), Blantyre, 3000 ft (1), Zomba Plateau, Kuchawe Inn, 1600 m (9).

#### 122b. *Chiasmia procidata fumida* (Wiltshire, 1980) comb. n.

not illustrated

*Semiothisa procidata fumida* Wiltshire, 1980a: 197. Holotype ♂, [Saudi Arabia]: Arabia: Abha, vi 1936 (HSt J.B. Philby), B.M.1937.-228; *Semiothisa procidata fumida* Wilts[ire] Holotype ♂ (BMNH) [examined]. Paratype (1♂). **[Saudi Arabia]:** (Arabia): Sharaghib, 4.xii.1936 (HSt J.B. Philby), B.M.1937.-228; *Semiothisa procidata fumida* Wilts[ire] Paratype ♂ (BMNH) [examined].

*Semiothisa procidata fumida* Wiltshire; Wiltshire, 1990: 134.

**DIAGNOSIS.** Adult. General appearance darker than in *procidata semispurcata* due to greyish suffusion. Whitish discal streak across hind wing and apical blotch on fore wing bordered by dark greyish-green scales.

**DISTRIBUTION.** Saudi Arabia.

**MATERIAL.** 1♂ and 1♀. 2 London (BMNH).

**LOCALITIES.** **Saudi Arabia:** As Nimas, 2450 m (1), Al-Foqa (*Olea-Dodonaea* zone) (1).

#### 123. *Chiasmia latimarginaria* (Rebel, 1907) comb. n.

Figs 414–416; 702, 923

*Osteodes latimarginaria* Rebel, 1907: 100. **LECTOTYPE** ♂, here designated, [Red Sea]: Rothes Meer, III.[18]99 (Simony); *Osteodes latimarginaria* Hmps. (NHMW) [examined]. See also Remarks. Paralectotypes (1♂, 2♀). **[Red Sea]:** same data as holotype (NHMW). The two ♀ are in poor condition, with abdomina missing.

*Osteodes latimarginaria* Rebel; Prout in Seitz, 1915b: 406; Rothschild, 1921: 217; Wehrli in Seitz, 1940: 655; Wiltshire, 1980a: 198; 1990: 134.

**FORE WING LENGTH.** 14 mm (♂), 11–13 mm (♀).

**ADULT** (Figs 414–416). Small. Wings glossy, ground colour yellowish-ochre with very well developed terminal shade. Apex of fore wings with an ochreous blotch. Discal spots very faint. Underside: markings similar, but discal spots better developed and basal half of hind wing occasionally with dark suffusion, apparently more frequently in males. Vestiture of body ochreous. Hind tibia of ♂ not modified. Seta comb on A3 absent.

**MALE GENITALIA** (Fig. 702). Uncus horns stout and curved; gnathos normal. Costa of valve long, somewhat dilated apically, without ventral process. Sacculus very narrow. Aedeagus short and strongly spindle-shaped; vesica bearing a single small cornutus. Octavals large, arcuate.

**FEMALE GENITALIA** (Fig. 923). Papillae anales large. Both pairs of apophyses slender and comparatively short, a. anteriores less than half length of a. posteriores. Antrum short and stout, flanked by two small lateral 'ears' formed by l. postvaginalis. Bursa copulatrix pyriform, stout. Signum absent.

**DIAGNOSIS.** *Chiasmia latimarginaria* is the smallest member of the *procidata*-group. Externally, adults are not unlike small specimens of 121. *C. turbulentata* on account of the well developed terminal shade, but are readily separable from the latter by the different markings on the underside of the hind wings.

**DISTRIBUTION.** Northern Africa (Algeria, Chad, Niger); Gulf of Aden to Saudi Arabia and Yemen.

**BIOLOGY.** The species appears to be associated with semidesert and desert habitats. Adults have been observed in March, May and November.

**MATERIAL.** 18♂ (1 dissected, Geometridae genitalia

slide No. 16099) (BMNH) and 12 ♀ (1 dissected, Geometridae genitalia slide No. 16100) (BMNH). 22 London (BMNH), 1 Florence (MZF), 7 C. Herbule collection.

**LOCALITIES.** **Saudi Arabia:** Mahidh (1), Najran (1), Salwa (1), Tarima (1), Badr (1), Ashaira (2). **Yemen:** Magis (= Madi) (1). **Niger:** Mts. Baguezan, Asben (14). **Algeria:** Oued Amra, N of Ideles (1). **Chad:** Tibesti, Terouane, 1000 m (7).

**REMARKS.** In the original description, the type locality is given more precisely as 25°30'N 35°30'E and the collection date as 25.III.1899.

#### 124. *Chiasmia warreni* (Prout, 1915) comb. n.

Figs 417, 418; 703, 924

*Osteodes exumbrata* Warren, 1902: 529, nec Walker [1863]. Nom. praeocc.

*Osteodes warreni* Prout, 1915a: 349 (as a replacement name for *exumbrata* Warren). Holotype ♂, [Kenya]: (British East Africa), Escarpment, Jan[uary] [19]01, 6500–9000 f[ee]t (W. Doherty); Rothschild Bequest B.M.1939-1; *Osteodes warreni* Prout ♂ type; Geometridae genitalia slide No. 9677 (BMNH) [examined]. See also Remarks. Paratypes (3♂, 1♀). [Kenya]: *ibidem*, dated January (♂), February (♀), and March–April (♂) (BMNH) [examined].

*Semiothisa warreni* (Prout): Fletcher, 1978a: 78; 1978b: 510.

**FORE WING LENGTH.** 16–18 mm (both sexes).

**ADULT** (Figs 417, 418). Ground colour of wings whitish with a faint ochreous tinge only. Terminal shade usually clearly developed on fore wing, its inner margin concave, but absent on hind wing. Fore wing with a whitish apical streak. Discal spots absent or virtually so. Underside whitish with strong grey suffusion, leaving only a pale postmedian fascia. Apical streak mostly well developed, discal spots small, black. Vestiture of body ochreous grey. Hind tibia of ♂ not modified. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 703). Uncus horns small; gnathos with slender arms and large medial element. Costa somewhat dilated apically, bearing a single pointed ventral process. Sacculus triangular, broadly rounded and exhibiting a small apical sclerotization. Aedeagus short and stout, not tapering posteriorly; vesica without cornuti but showing apical sclerotization. Octavals small, arcuate.

**FEMALE GENITALIA** (Fig. 924). Papillae anales rather large. Apophyses posteriores very long and slender, a. anteriores markedly stouter, about half length of former. Antrum prominent, shell-shaped and flanked by rounded

sclerotizations formed by sterigma. Bursa copulatrix large, taking the form of an elongated sac. Signum very small, nail-like.

**DIAGNOSIS.** Similar to *Chiasmia procidata* but characterized by its usually larger size and the more pallid ground colour on the upperside which is whitish rather than ochreous. The differences in genitalic structure are apparent from the illustrations (compare Figs 701, 703 and 922, 924).

**DISTRIBUTION.** East Africa, recorded from Kenya and Tanzania.

**BIOLOGY.** Adults were observed in January and June; in the Escarpment area of Kenya specimens were collected at an altitude of 2150–3000 m (6,500–9,000 feet).

**MATERIAL.** 9♂ (1 dissected, Geometridae genitalia slide No. 16101) (BMNH) and 6♀ (1 dissected, slide L 644 (NMBZ)). 11 London (BMNH), 1 Bulawayo (NMBZ), 3 Nairobi (NMKE).

**LOCALITIES.** **Kenya:** Naivasha (2), Morendon Estates nr. Naivasha (2), Escarpment (1), S., Besil, 6500 ft (3), Nakura (4), Nairobi (1). **Tanzania:** Usa River, 3900 ft (2).

**REMARKS.** The original description of *exumbrata* by Warren (1902) is based on 36 syntypes collected by William Doherty; of these, only five (the holotype and four paratypes of *warreni*) were located in BMNH.

#### 125. *Chiasmia pervittata* (Hampson, 1909) comb. n.

Figs 419, 420; 704, 925

*Osteodes pervittata* Hampson, 1909: 120. Holotype ♂, [Uganda]: Coll[ected] by [the] Hon[orable] G. Legge & A.F.R. Wollaston; S.E. Ruwenzori, 3500 f[ee]t, 30.iv.1906, 1906.–153; *Osteodes pervittata* Hmpsn. ♂ type (BMNH) [examined]. Paratypes (2♂). [Uganda]: 1♂, *ibidem*, dated 14.v.1906. 1♂, Toro, Wimi R[iver], 30.xii. (C. Christy), 1905.–4 (BMNH) [examined].

**FORE WING LENGTH.** 16–17 mm (both sexes).

**ADULT** (Figs 419, 420). Ground colour of wings rich ochreous, frequently with grey suffusion, in particular on fore wings. Apical streak and discal spots absent, terminal shade at most very weakly developed. Underside: light ochreous with darker suffusion, especially along costa of fore wing and on hind wing. Discal spots weakly developed, relatively larger on fore wing. Hindwing with a white streak running from base towards termen, encompassing discal spot. Vestiture of body ochreous. Hind tibia of ♂ dilated. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 704). Uncus horns medium-sized; gnathos very large. Valves unusual in shape for the group in that sacculus and costa are fused for about half of their length. Costa slightly dilated apically, with a very short and pointed ventral process. Aedeagus small relative to size of genitalia, well sclerotized apically. Vesica with a single rather broad cornutus. Octavals heavily sclerotized and very conspicuous, furcate and acutely pointed.

**FEMALE GENITALIA** (Fig. 925). Papillae anales large, appearing swollen. Both pairs of apophyses slender, a. anteriores about half length of a. posteriores. Sterigma very elaborate. Bursa copulatrix pear-shaped, entirely membranous. Signum absent.

**DIAGNOSIS.** The long pectinations of the antenna of the male and the thick scaling and virtual absence of a terminal shade are characteristic. The male genitalia resemble those of *C. warreni* (in both, the costa of the valve bears a ventral process), but in *pervittata* the gnathos is much more massive and the octavals are much more heavily sclerotized. In the female, the absence of a signum and structure of the sterigma provide the best characters for identification.

**BIOLOGY.** Probably a savanna species. Adults have been observed in April–May and in December.

**DISTRIBUTION.** Zaire and East Africa (Rwanda, Uganda, Kenya and Tanzania).

**MATERIAL.** 16♂ (2 dissected, genitalia slide M. Krüger No. 1 (NMKE); Geometridae genitalia slide No. 16103) (BMNH)) and 10♀ (1 dissected, Geometridae genitalia slide No. 16104). 15 London (BMNH), 1 Nairobi (NMKE), 10 C. Herbulot collection.

**LOCALITIES.** **Tanzania:** Distr. of the Great Craters (1). **Uganda:** no further data (1), E. of Lake George, Ankole-Toro border, 4500 ft (1), Ankole (1). **Rwanda:** SE., Rusumo, 1300 m (4), C.-S., Karama-Bugesera, 1400 m (6). **Kenya:** Suna, S. Kavirondo (2), Fort Hall-Embo road, 5000 ft (1), Nairobi (2), Nairobi to Mt. Kenya (1), Lumbwa (1), Nandi plateau, 57–6200 ft (1), Maboroni/Nandi (1), Kaimosi (1). **Zaire:** Katanga Distr. (1), Sandoa (1).

## 17. *Chiasmia furcata*-group

This, the sister-group of the *procidata*-group, comprises four small to medium-sized and mostly light ochreous, olive, or brown species with slightly pointed fore wings and a rounded hindwing termen. The antennae are simple or bipectinate in the male, the pectinations sometimes being rather long, and simple in the female. This group is further closely related to the *C. observata*-group, below: both share an apomorphy of the male genitalia (sacculus forming a short, drooping

process). An important autapomorphy defining the *furcata*-group appears to be the wing pattern.

**MALE GENITALIA** (Figs 705–708). Uncus horns well developed; gnathos mostly small, with narrow arms. Costa of valve rather massive, straight or at most weakly curved and lacking ventral process. Valvula absent. Sacculus small, produced into a beak-shaped, drooping process. Aedeagus attenuated apically or fusiform; in most species vesica with a single small median cornutus and some apical microcornuti. Octavals prominent, broadly arcuate.

**FEMALE GENITALIA** (Figs 926–929). Papillae anales well developed; apophyses weak. Sterigma with l. antevaginalis unmodified; l. postvaginalis forming sclerotizations on sides of ostium in one species. Antrum small to prominent. Corpus bursae elongated; in two species ductus ribbed; corpus membranous. Signum very small and occasionally fragmented to medium-sized. Signum of *C. furcata* with strong intraspecific variation in size and ranging from broadly elliptical to very small.

The group has its centre of distribution in the drier parts of southern Africa, in particular the western Cape Province, Namibia and Botswana; one species is confined to East Africa.

## Key to species

- 1 Small (fw length 10–13 mm), mostly greyish moths with a clear separation between postmedian fascia and preapical spot (Fig. 427). ♂ genitalia (Fig. 708) with very short uncus horns and lacking cornuti on vesica. ♀ genitalia (Fig. 929) elongated, with simple antrum ..... 129. *grimmia* (Wallengren), p. 235
- Larger (fw length 11–17 mm), yellowish, ochreous or brownish moths with indistinct separation between postmedian fascia and preapical spot (Figs 421–426). ♂ genitalia (Figs 705–707) with larger uncus horns and cornuti on vesica. ♀ genitalia (Figs 926–928) stouter or, if elongated, with larger antrum ..... 2
- 2(1) Pale ochreous species with well developed, pale median fascia and straight postmedian line (Fig. 426). ♂ genitalia (Fig. 707) with process of sacculus not well developed. ♀ genitalia (Fig. 928) with large corpus bursae. East Africa ..... 128. *butaria* (Swinhoe), p. 234
- Variously coloured but mostly darker moths with less well developed median fascia and irregular, angled postmedian line (Figs 421–425). ♂ genitalia (Figs 705, 706) with process of sacculus better developed. ♀ genitalia (Figs 926, 927) with smaller, pear-shaped or elongated corpus bursae. Southern Africa ..... 3
- 3(2) Moths with strongly patterned wings (Fig. 425). ♂ genitalia (Fig. 706) with rather stout aedeagus;

- octavals as illustrated. ♀ genitalia (Fig. 927) elongated, with sterigma forming two sclerotized lobes on sides of antrum .....  
..... 127. *inaequilinea* (Warren), p. 233
- Moths with less strongly patterned moths (Figs 421–424). ♂ genitalia (Fig. 705) with more slender aedeagus; octavals as illustrated. ♀ genitalia (Fig. 926) with sterigma not modified as above .....  
..... 126. *furcata* (Warren), p. 232

## 126. *Chiasmia furcata* (Warren, 1897) comb. n.

Figs 421–424; 705, 926; 1021

*Tephritis furcata* Warren, 1897a: 112. LECTOTYPE ♂, here designated, [South Africa, KwaZulu-Natal]: Weenen, Natal; *Tephritis furcata* Warr. ♂ type: Rothschild Bequest B.M. 1939–1 (BMNH) [examined]. Paralectotype (1 ♀). [South Africa]: same data as holotype [not examined]. See Remarks.

*Tephritis furcata* Warren; Hampson, 1910: 468.

*Tephritis furcata* (Warren); Janse, 1917: 112.

*Semiothisa furcata* (Warren); Janse, 1932: 214.

FORE WING LENGTH. 11–17 mm (♂), 11–16 mm (♀).

ADULT (Figs 421–424). Variable in size and markings, ranging from pale ochreous to greenish-brown. Ground colour ochreous white, finely dusted with grey. Basal line present on fore wing only, very faint; median line present on both wings, but fainter on hind wing; postmedian line usually well developed on both wings. Discal spots moderately well developed to nearly absent. A broad pale fascia usually present in median area. Underside: pale ochreous with fine grey dusting, proximal half of terminal area with a darker shade. Discal spots mostly present. Vestiture of thorax and body ochreous-grey. Hind tibia of ♂ not modified. Setal comb on A3 absent.

MALE GENITALIA (Fig. 705). Uncus horns prominent; gnathos well developed. Costa of valve elongated, slightly curved and without ventral process. Sacculus small, distal margin extended to form drooping process. Aedeagus pointed; vesica with a single median cornutus and a group of microcornuti a short distance from apex. Octavals broadly arcuate, weakly sclerotized.

FEMALE GENITALIA (Fig. 926). Papillae anales large. Both pairs of apophyses slender, short; a. anteriores only about one-third length of a. posteriores. Sterigma not modified. Antrum massive. Ductus bursae short and stout, ribbed, its posterior part sclerotized. Corpus bursae more or less rounded. Signum with strong intraspecific variation in size, medium-sized to almost absent.

EARLY STAGES (Figs 1e, 6d). Egg: Green, length 0.6 mm, width 0.4 mm. Shape and as described for the genus (Fig. 1e). Eggs darken prior to hatching. Larva. First instar: length 1.4 mm, width 0.18 mm. Head: width 0.22 mm, light brown, ocelli darker. Body: dorsal area yellowish-green on T1–2 and A4–10, darker green on T3–A3. Lateral area identical, with a slightly paler green central line just visible. Ventral area predominantly purplish-brown between thoracic legs and prolegs, paler yellowish-green on A6–10. Thoracic legs and prolegs yellowish-green to light brown. Second instar: length 6 mm, width 0.5 mm. Head: width 0.65 mm, ground colour light brown, with extensive dark brown maculation on posterior part of cranium; ocelli also darker. Body green, with extensive blackish-brown markings. Dorsal area with numerous poorly defined darker lines; only central line clear. Lateral area similar, two pairs of small protuberances on A2 and A3. Ventral area considerably darker, only intersegmental areas appearing paler, otherwise uniformly blackish-brown. Thoracic legs and prolegs light brown, with a few black spots around setal bases. Third instar: length 14 mm, width 1.3 mm. Head: width 1.25 mm. Coloration as for L2. Body green, with extensive brown markings. T1–3 darker than abdominal segments. Dorsal area with wedge-shaped dark pigmentation bordering intersegmental areas. Lateral area with one central lighter patch per segment. Ventral area with one conspicuous black spot per segment, otherwise similar to dorsal area. Fourth instar: length 25 mm, width 2.0 mm. Head: width 1.8 mm, greenish-brown with extensive dark brown markings on genae and occiput. Body: overall impression dark greenish-brown to dark brown; ground colour greenish-brown to sepia. Dorsal and lateral areas densely covered with wavy brown lines. Sides somewhat paler than back, with double, broken, dark lateral line. No conspicuous protuberances present. Ventral area as dorsum, with fine greenish middle line. Thoracic legs blackish, prolegs concolorous with body. Pupa: shape of cremaster as in Fig. 6d.

DIAGNOSIS. Although quite variable, *C. furcata* can be separated from the two similar members of the group, 127. *C. inaequilinea* and 129. *C. grimmia*, by the darker postmedian band which is entire and not interrupted below the costa.

BIOLOGY. Although there are a number of records from KwaZulu-Natal, this is a savanna species with a clear preference for drier conditions. In South Angola, the species occurs in *Terminalia* sandveld. Recorded foodplants are *Acacia karroo* (Hayne) and *A. nilotica*. Adults have been recorded throughout the year.

DISTRIBUTION (Fig. 1021). Southern Africa, from Zambia and Malawi southwards to South Africa, but rare in the northern part of its range. In South Africa generally distributed in the Transvaal and KwaZulu-Natal.

MATERIAL. 98♂ (10 dissected, TM genitalia slides No. 947, 10859, 10946, 10948, 10950–10952, 10954, 10955; Geometridae genitalia slide No. 16152 (BMNH)) and 101♀ (12 dissected, TM genitalia slides No. 10860, 10935, 10947, 10949, 10953, 10958, 11090, 11178–11181; slide AcP 9295 (SANC)). 15 London (BMNH), 118 Pretoria (TM), 11 Pretoria (SANC), 6 Cape Town (SAM), 1 Windhoek (SMWN), 5 Bulawayo (NMBZ), 1 D.M. Kroon collection, 12 N.J. Duke collection, 30 H.S. Staude collection.

LOCALITIES. **South Africa, Transvaal:** [Gauteng]: Johannesburg (2), Pretoria (22), Magaliesberg (3), Silverton (2), Zoutpan N. Pretoria (2), Boekenhoutskloof (3). [North-West]: Rustenburg (17), Christiana (2), Pilanesberg National Park, 1200 m (2). [Northern Province]: Derdepoort (1), Rooiberg (9), Blouberg, N. side, Glenferness (10), NE Soutpansberg District (1), Great Saltpan, Soutpansberg (1), 3 m N. Wyllie's Poort (1), Messina (3), near Chuniespoort (1), Harmonie Farm (1), Maraheki TP (1), Nylsvley (1), Limburg (1), Lalapanzi (1), Mutale (1), Warmbaths (2), Onverwacht/Ellisras, 900 m (1), Mmabolela Estate (1). Kruger National Park: Satara (3), Pafuri (1), Shingwidzi (4), Punda Milia (1), Letaba Camp (4). [Mpumalanga]: Lower Sabi (1), Skukuza (5), Crocodile River (1), Marble Hall (1), Pongola (1), Hectorspruit (1). **Cape Province:** [Northern Province]: Warrenton (1). **KwaZulu-Natal:** Muden (10), Mkuze (11), Weenen (1), near Inchanga (1), Nkwaleni, Zululand (1). Colenso (1), Jozini Dam (4), M'fongosi, Zululand (3). **Botswana:** Gaborone (5), Bakgatla, Sebele (2), Kalahari, no further data (1). **Namibia:** Mashare (1), Ghaub Valley (1), Kalkfontein (3). **Angola:** S., Mucusso, 1000 m (8). **[Malawi]:** (Nyasaland), NW Lake Nyasa, Florence B[ay] to Karonga (6), below Chiromo (1), Zomba, Upper Shire Distr. (1). **Zimbabwe:** Umvuvuma, Mutare District (1), Masoka, Chiware Safari Area (3), Hot Springs (2), Matetsi (1), Wankie (1), Victoria Falls (1), Doddieburn Ranch (4). **Zambia:** Niamadzi River near Nawalia, 2000 ft (3), b[an]jk [of] Loangwa River, 1700 ft (2), Kitwe (1). **Not traced:** Groendl. (1).

REMARKS. Warren based his description of *Tephritis furcata* on one male and one female syntype; the latter was not traced in BMNH.

#### 127. *Chiasmia inaequilinea inaequilinea* (Warren, 1911) comb. n.

Figs 425; 706, 927; 1022

*Peridela inaequilinea* Warren, 1911: 26. Holotype ♂, [South Africa, Northern Cape]: Cape, Namaquah [sic], Worden/Ookiep 22.9.[18]86 (SAM) [examined]. See Remarks.

*Peridela inaequilinea* Warren; Janse, 1917: 112.

*Peridela birecta* Prout, 1917: 70. Holotype ♂, [South Africa, Northern Cape]: Cape, Namaquah [sic], Worden/Ookiep 22.9.[18]86; L. Prout Determ[inavit]; *Peridela birecta* Prout ♂ type; 8.; This specimen is also the type of Warren. See p.26 Ann[als] [of the] S[outh] Afr[ican] Mus[eum] X. (A.T. Hesse); *Semiothisa inaequilinea* Warr., A.J.T. Janse det. (SAM) [examined]. Paratypes: the three paratypes from Bloemfontein mentioned in the original description were not traced in BMNH.

*Semiothisa inaequilinea* (Warren); Janse, 1932: 215.

*Peridela birecta* Prout; Janse, 1932: 215 (synonymy).

FORE WING LENGTH. 11–16 mm (both sexes).

ADULT (Fig. 425). Rather variable in coloration, but fore wings always much darker than hind wings. Ground colour whitish, finely dusted with grey. On fore wing, basal and postmedian line well developed; hind wing usually only with postmedian line present. Discal spots present but small. Median area of fore wing marked by a broad pale fascia; postmedian line on fore wing with a usually well-marked greenish-brown fascia, interrupted below costa. Underside: pale ochreous, finely dusted with grey; the dark postmedian fascia usually present, otherwise without markings. Discal spots inconspicuous. Vestiture of thorax and abdomen ochreous-grey. Hind tibia of ♂ not modified. Setal comb on A3 absent.

MALE GENITALIA (Fig. 706). Uncus horns and gnathos well developed. Costa of valve straight, slightly dilated apically and without ventral process. Sacculus small, with prominent drooping process. Aedeagus fusiform; vesica bearing a very small median cornutus and exhibiting a finely spinose area near centre. Octavals large, arcuate.

FEMALE GENITALIA (Fig. 927). Papillae anales well developed. Both pairs of apophyses slender, a. anteriores about half length of a. posteriores. Sterigma forming two conspicuous sclerotizations on sides of ostium. Antrum stout, shell-shaped. Bursa copulatrix resembling a gradually widening tube. Ductus bursae strongly ribbed posteriorly. Signum very small.

DIAGNOSIS. Similar to *Chiasmia furcata*, but characterized by the interrupted postmedian fascia. *C. grimmia*, below, has the same pattern of markings but is smaller and always marked in various shades of grey, never greenish-brown or ochreous.

BIOLOGY. *Chiasmia inaequilinea* inhabits dry savanna and Karoo habitats. Adults have been observed in all months of the year except March, but are most abundant from October to January.

DISTRIBUTION (Fig. 1022). Semiarid areas of South Africa (localised in the Transvaal, more widely occur-

ring in Free State and Cape Province; Namibia. An isolated population occurs in the Soutpansberg area in northern Transvaal.

MATERIAL. 67♂ (2 dissected, TM genitalia slides No. 957, 10932) and 144♀ (1 dissected, TM genitalia slide No. 10933). 2 Munich (ZSBS), 193 Pretoria (TM), 2 Pretoria (SANC), 2 Cape Town (SAM), 3 Windhoek (SMWN), 5 N.J. Duke collection, 4 H.S. Staude collection.

LOCALITIES. **South Africa, Transvaal:** [Northern Province]: Zoutpan, Zoutpansberg (12). [North-West]: Panfontein/Bloemhof (2). **Free State:** Bloemfontein (1), Zastra (2), Oranjekrag, H.F. Verwoerd Dam (40). **Cape Province:** [Northern Cape]: P.K. LeRoux Dam, Van der Kloof (18), Pofadder (7), Richtersveld (2), Vioolsdrif (2), Springbok (1), Farm Deurdrif near Springbok (1), Kimberley (1), Soebatsfontein (2), Hutchinson (2), Van Rhyn's Dorp (1), Gifberg near Van Rhyn's Dorp (1), Douglas (1). [Western Cape]: Beaufort West (6), Seweweekspoort (4), Stellenbosch (1), Ceres (1), between Ceres and Sutherland (2), Willowmore (3), Oudtshoorn (1), Matjiesfontein (2). [Eastern Cape]: Steynsburg (3), Mountain Zebra Nat. Pk. near Cradock (1), Cradock (1), Quinera River (1), Graaff-Reinet (5). Ambiguous: S. Cape Province (1), Klipplaat (8). **Namibia:** Bullspoort (12), Valencia Farm, Rehoboth District (4), Farm Djab, Rehoboth District (2), Asab (3), Hardap Dam, Mariental District (3), Abachaus (6), Karasberge, Farm Noachabib (1), Gobabeb (2), Okahandja (7), Kharixas, Welwitschia (2), Omaruru (1), Elephants River, 20 m NW. Blumefeld (15), J. van Noord (1).

REMARKS. *Peridela birecta* Prout, 1917 is a junior objective synonym of *P. inaequilinea* Warren, 1911. In the collections of SAM exists a ♂ specimen, labelled: **[South Africa]:** Cape. Between Courland's Kloof and Beaufort/ Sept[ember] 1872; 38; *Peridela inaequilinea* Warr. Type; Type; not 'type' by ser. loc. dr. (SAM) [examined]. This specimen cannot be regarded as the type, as Warren's original description states '1 ♂ from Namaqualand, South Africa (Worden)'. This latter specimen is the one on which both Warren and Prout based their species.

#### 127a. *Chiasmia inaequilinea eremias* (Prout, 1935) comb. n.

not illustrated

*Tephrina (Peridela) inaequilinea eremias* Prout, 1935: 10. LECTOTYPE ♂, here designated, **[Botswana]:** Gemsbok Pan, V[ernay]-L[ang] Kal[ahari] Exp[edition], 23.4.-5.5.[19]30; *Tephrina inaequilinea eremias* Prout ♂ Type No. 2413; *Tephrina (Peridela) inaequilinea eremias* Prout ♂

type [handwritten]; TM Lep[idoptera] Het[erocera] Genitalia slide No. 10995 (TM) [examined]. Paralectotypes (5♂, 1♀). Examined: 2♂, 1♀. **[Botswana]:** same data as holotype (♀ dissected, TM Lep. Het. Genitalia slide No. 10996) (TM). See also Remarks.

DIAGNOSIS. Adult. Separable from most specimens of *iaequeilinea inaequilinea* by heavier dusting, resulting in a more greyish appearance.

DISTRIBUTION (Fig. 1022). Botswana (western Kalahari Gemsbok Park).

MATERIAL. Known from the types only.

REMARKS. Prout's description of *eremias* is based on 5♂ and 1♀ syntypes; only 1♂ and 1♀ of these were traced in TM (designated as LECTOTYPE and Paralectotype, respectively). Further specimens may be housed in BMNH (L.B. Prout collection). The validity of this subspecies remains doubtful until more material from Botswana becomes available.

#### 128. *Chiasmia butaria* (Swinhoe, 1904) comb. n.

Figs 426; 707, 928

*Semiothisa butaria* Swinhoe, 1904: 510. Holotype ♂. **[Tanzania]:** Kilimanjaro, 87.140; *Semiothisa butaria* Swinhoe ♂ type; Genitalia slide Geom[etridae] 1951-192 (BMNH) [examined]. Paratypes (2♂). **[Kenya]:** 1♂, Machakos to Neugia. **Central Africa:** 1♂, no further data (BMNH) [not examined]. *Semiothisa (Peridela) butaria* Swinhoe; Aurivillius, 1910: 37.

*Tephrina butaria* (Swinhoe); Fawcett, 1916: 728; Prout, 1916b: 160, 1932a: 481.

*Semiothisa butaria* Swinhoe; Fletcher, 1978a: 82.

FORE WING LENGTH. 11-15 mm (♂), 14-16 mm (♀).

ADULT (Fig. 426). Of medium size. Wings cream white with only sparse brown striation. Basal and postmedian line more or less reduced; median developed more as a fascia, broader on fore wing. Discal spots inconspicuous. Preapical spot brown. Postmedian area partly suffused with light brown. Underside cream white with sparse brown striation; median and postmedian developed as incomplete brown fasciae. Discal spots present. Vestiture of thorax and abdomen ochreous. Hind tibia of ♂ not modified. Setal comb on A3 absent.

MALE GENITALIA (Fig. 707). Uncus horns and gnathos normally developed. Costa of valve fairly massive, straight and without ventral process. Sacculus small, hardly wider than costa. Aedeagus curved, apex acutely pointed; one small median cornutus present on vesica. Octavals broadly arcuate, with evenly rounded tips.

FEMALE GENITALIA (Fig. 928). Very large for the size of the moth. Papillae anales elliptical, rounded. Both pairs of apophyses strong, a. anteriores about two-thirds length of a. posteriores. Sterigma: l. antevaginalis not modified; l. postvaginalis forming two narrow and curved, sclerotized bands. Antrum very prominent elongated. Bursa copulatrix very large, squarish, without defined ductus. Signum large, elliptical.

DIAGNOSIS. Characterized by its generally pale appearance; in particular the whitish median area is typical. 151. *C. olindaria*, below, is similar, but larger and with more even dark dusting.

BIOLOGY. Presumably a savanna species. Adults have been collected in May–June and in November.

DISTRIBUTION. East Africa, from Somalia to Tanzania.

MATERIAL. 21♂ (1 dissected, genitalia slide M. Krüger No. 7 (NMKE) and 9♀ (2 dissected, genitalia slide M. Krüger No. 38 (NMKE); Geometridae genitalia slide No. 16927 (BMNH)). 1 London (BMNH), 5 Berlin (ZMHB), 2 Munich (ZSBS), 1 Florence (MZF), 3 Nairobi (NMKE), 1 Pretoria (TM), 17 C. Herbulot collection.

LOCALITIES. **Tanzania:** Meru (2), Mombo (2), Massai Steppe (1), Lake Ndutu, Ngorognoro (1), (no further data) (2), Ikoma (1), 50 m S. Dodoma (1). **Kenya:** Mutha (2), Musthomo (1), Shombole (1), Mbolo Hill, Voi Distr. (1). **Rwanda:** Centre-Sud, Karama Bugesera, 1400 m (1). **Ethiopia:** Debré Zeit, 1800 m (12). **Somalia:** Mogadiscio (1), Afgoi (1).

### 129. *Chiasmia grimmia* (Wallengren, 1872) comb. n.

Figs 427; 708, 929; 1023

*Macaria grimmia* Wallengren, 1872: 57. Type material not stated. [Namibia]: Kuisip River territory (not located in UZIL or NRS and probably lost) [not examined]. Wallengren's description refers to the whitish colour of the moth and the postmedian fascia which is interrupted in a conspicuous fashion. There is no other Namibian *Chiasmia* species that would fit his diagnosis.

*Tephritisopsis illineata* Warren, 1901: 214. Holotype ♂, [Angola]; Benguela, I.I.[18]99(Penrice); VIII.214/ *Tephritisopsis illineata* Warr. ♂ type; abdomen guaranteed L.B.P[rout]; Rothschild Bequest B.M. 1939–1 (BMNH) [examined].

*Tephritisopsis illineata* Warren; Swinhoe, 1904: 583 (as good species); Janse, 1932: 226 (synonymy).

*Macaria grimmia* Wallengren; Janse, 1917: 113. *Discalma illineata* (Warren); Janse, 1917: 113.

*Semiothisa grimmia* (Wallengren); Janse, 1932: 226; Prout, 1935: 11; Pinhey, 1975: 86.

FORE WING LENGTH. 10–12 mm (♂), 11–13 mm (♀).

ADULT (Fig. 427). Small, with comparatively narrow wings. Ground colour whitish, finely dusted with grey. Basal and median lines weak or absent, postmedian line better developed, bordered on fore wing by a broad, dark brown-grey fascia which is interrupted below costa. Hind wing with postmedian line only. Discal spots faint. Underside similar to upperside, markings appearing fainter. Thorax and abdomen whitish-grey. Hind tibia of ♂ not modified. Seta comb on A3 absent.

MALE GENITALIA (Fig. 708). Uncus horns minute; gnathos rather delicate. Costa of valve nearly straight, without ventral process. Sacculus well developed, exhibiting a small, discrete sclerotization. Aedeagus rather small, straight; vesica without cornuti. Octavals w-shaped with well rounded tips; weakly sclerotized.

FEMALE GENITALIA (Fig. 929). Papillae anales medium-sized. Apophyses normal, a. anteriores about half length of a. posteriores. Antrum small. Bursa copulatrix elongated, with transition between ductus and corpus bursae gradual. Signum small and circular.

DIAGNOSIS. Similar to *Chiasmia inaequilinea* above, but characterized by its lesser size, the simple antennae in the ♂ and the greyish, never olive, brown, or ochreous markings. The differences in genitalia structure are evident from the illustrations (compare Figs 706, 708 and 927, 929).

BIOLOGY. The species inhabits dry savanna and Karroo habitats. Adults have been observed from January to April and again from September to December.

DISTRIBUTION (Fig. 1023). Southern Africa, locally in Angola and Zimbabwe, more widely distributed in Namibia, Botswana, the Transvaal and Cape Province.

MATERIAL. 55♂ (3 dissected, TM genitalia slides No. 2716, 10930, 10934) and 62♀ (1 dissected, TM genitalia slide No. 10931). 2 London (BMNH), 84 Pretoria (TM), 2 Cape Town (SAM), 17 Bulawayo (NMBZ), 10 Windhoek (SMWN), 1 N.J. Duke collection, 1 H.S. Staude collection.

LOCALITIES. **South Africa, Transvaal:** [Northern Province]: Langjan Nature Reserve (3), Zoutpan, Soutpansberg (2), Mmabolela Estate (2), Pentonville 60 m N. Vaalwater (1), Waterberg District (2), Huwi Private Nat. Res., Ellisras District (2). [North-West]: Christiana (1). [Mpumalanga]: Marble Hall (2). **Cape Province:** [Northern Cape]: P.K. LeRoux Dam, Van der Kloof (21), Vanderkloof (1), Van Zylsrus, Gordonia District (1), Kuruman to Griquatown (3), Khuis op Malopo (1), Douglas (1). [Western Cape]: Clovelly (4). **Namibia:** Windhoek (9), Farm Valencia 42, Windhoek

District (1), Okahandja (6), Grootfontein (2), Otjitembi (3), Omuramba, Omatako River (1), Abachaus (22), Ghaub Valley (3), Mashare (1), Otjiverongo (3). **Botswana:** Kuke Pan (1), Maun (1), 16 km NE. Maun (1), 8 m N. Maun (3), 25 m E. of Tshane on Kang Road (9), Notwane Road, 23 km S. Gaborone (1), Makala-ma-Bedi (2). **Zimbabwe:** Bulawayo (1).

### 18. *Chiasmia observata*-group

The two members of this group are closely related both in facies and genitalic structure to the species of the *furcata*-group, the main difference being found in the female genitalia, which display a very large, funnel-shaped antrum. This character also provides the autapomorphy defining the group (Figs 930, 931). One species is endemic to the Cape Province in South Africa, the other has a continuous distribution from the eastern Cape Province to Saudi Arabia.

### Key to species

- 1 Moths ochreous with leathery brown suffusion; dark median streak on fore wing massive and curved (Fig. 428). ♂ genitalia (Fig. 709) with narrow sacculus; ♀ genitalia (Fig. 930) as illustrated. Cape Province ..... 130. *observata* (Walker), p. 236
- Moths yellowish-ochre with faint olivaceous suffusion; dark median streak on fore wing thinner and hardly curved (Fig. 429). ♂ genitalia (Fig. 710) with broad sacculus; ♀ genitalia (Fig. 931) as illustrated. Widely distributed in eastern part of Afrotropical region ..... 131. *subcurvaria* (Mabille), p. 237

### 130. *Chiasmia observata* (Walker, 1861) comb. n.

Figs 428; 709, 930; 1024

*Tephrina observata* Walker, 1861: 963. Holotype ♂, **South Africa/44 6; Tephrina observata** (BMNH) [examined].

*Tephrina ?observata* Walker; Wallengren, 1875: 122. *Tephrina observata* Walker; Swinhoe, 1904: 512; Hampson, 1909: 122; Aurivillius, 1910: 38; Hampson, 1910: 469.

*Discalma observata* (Walker); Janse, 1917: 114. *Semiothisa observata* (Walker); Janse, 1932: 217.

FORE WING LENGTH. 13–15 mm (♂), 11–14 mm (♀).

ADULT (Fig. 428). Ground colour of wings ochreous, dusted with greyish-brown and fore wings more or less wholly suffused with brown except for an ochreous median fascia. Fore wings with positions of the three lines marked by broad blackish streaks that do not reach costa. Streaks curved, basal and median streak mostly anastomosing at base. Apex of fore wing exhib-

iting a paler streak. Hind wings practically devoid of lines but with a brownish postmedian shade. Discal spots minute, visible on hind wing only. Underside: ochreous brown with darker dusting on hind wing and along costa of fore wing. Markings as on upperside, but appearing paler. Hind tibia of ♂ not modified. Setal comb on A3 absent.

MALE GENITALIA (Fig. 709). Uncus horns and gnathos well developed. Costa of valve large, straight and lacking ventral process. Sacculus small, distal margin forming drooping process. Aedeagus long and slender; vesica with a single, small median cornutus and a small patch of microcornuti near apex. Octavals broadly arcuate, large.

FEMALE GENITALIA (Fig. 930). Papillae anales large. Apophyses rather slender, a. anteriores about half length of a. posteriores. Sterigma with l. postvaginalis forming two small sclerotizations on sides of ostium. Antrum very large. Corpus bursae elongated, with a very small signum.

EARLY STAGES. No description available, but see under Biology.

DIAGNOSIS. See under *C. subcurvaria*, below.

BIOLOGY. *Chiasmia observata* inhabits both fynbos and Karoo-type habitats, although the food plant of its larva occurs much more widely. Adults have been collected in January–February, May, and from September to December. The larva has been bred on *Acacia karroo* Hayne (Taylor, 1949).

DISTRIBUTION (Fig. 1024). South Africa south of 29°S, including former territory of Transkei.

MATERIAL. 39♂ (2 dissected, TM genitalia slides No. 982, 10925) and 39♀ (1 dissected, TM genitalia slide No. 10926). 61 Pretoria(TM), 1 Pretoria(SANC), 5 Cape Town(SAM), 1 Nairobi(NMKE), 9 N.J. Duke collection, 1 H.S. Staude collection.

LOCALITIES. **South Africa, KwaZulu-Natal:** Durban (1). **Free State:** Zastraon (2), Bloemfontein (1), Oranjekrag, H.F. Verwoerd Dam (18), Abraham's Kraal (1). **Cape Province:** [Northern Cape]: P.K. LeRoux Dam (4). [Eastern Cape]: Mountain Zebra National Park near Cradock (1), Cradock (1), Port Elizabeth (1), Queenstown (2), East London (1), Grahamstown (1), Beaufort West (1), Lake Mentz (1), Kirkwood (1), Quinera River (1), Graaff-Reinet (2), Umtata (1), Pondoland, no further data (1). [Western Cape]: Seweweekspoort (1), Willowmore (4), Oudtshoorn (7), Stormsriviermond Coastal National Park (1), Cape Town (2), Van Rhyn's Dorp (4). [Northern Cape]: Hutchinson (1), Gifberg near Van Rhyn's Dorp (1). Ambiguous: Klipplaat (13), Waterford (2).

**131. *Chiasmia subcurvaria subcurvaria* (Mabille, 1897) comb. n.**

Figs 429; 710, 931; 1023

*Discalma subcurvaria* Mabille, 1897: 228. Holotype ♀, [Sine patria]: [West Africa], [undecipherable]; *T. subcurvaria* Mb.; Ex Musaeo P. Mabille 1923; Ex Oberthür Coll. Brit. Mus. 1927.-3; *Tephrina subcurvaria* Mabille, Holotype ♀, det. D.S. Fletcher 1966 (BMNH) [examined].

*Tephrina subcurvaria* (Mabille); Swinhoe, 1904: 583; Le Cerf, 1922: 444.

[*Tephrina observata* Walker; Swinhoe, 1904: 512; Hampson, 1910: 469. Misidentification.]

*Discalma subcurvaria* Mabille; Prout, 1916b: 157, 1932a: 485, 1935: 10; Janse, 1917: 114; Debauche, 1938: 46.

*Semiothisa subcurvaria* (Mabille); Janse, 1932: 209; Pinhey, 1975: 86; Fletcher, 1978a: 78.

FORE WING LENGTH. 11–14 mm (both sexes).

ADULT (Fig. 429). Ground colour of wings straw-yellow, finely dusted with grey, particularly in basal half. All lines present on fore wing but very faint, their position marked by broad, fairly straight blackish streaks that do not reach the costa. Terminal area of fore and hind wing with an olive shade. Discal spots present but inconspicuous. Underside similar to upperside. Vestiture of thorax and abdomen ochreous, mixed with darker scales. Hind tibia of ♂ not modified. Setal comb on A3 absent.

MALE GENITALIA (Fig. 710). Large for the size of the moth. Uncus horns well developed; gnathos normal. Valve broad; costa slightly recurved and without ventral process; sacculus about twice width of costa, apex extended to form a short, curved process. Aedeagus long, tapering anteriorly and posteriorly. Vesica bearing a small median cornutus and exhibiting a faint subapical serrations. Octavals large, arcuate.

FEMALE GENITALIA (Fig. 931). Papillae anales narrow. Both pairs of apophyses slender, a. anteriores about half length of a. posteriores. Sterigma: l. antevaginalis not modified, l. postvaginalis forming two prominent sclerotizations on sides of ostium. Antrum massive, broadly funnel-shaped and totally replacing membranous ductus; corpus bursae somewhat square; signum very small.

EARLY STAGES (Figs 1c, 1d, 6e). Egg: length 0.4 mm, width 0.23 mm. Differing from eggs of other *Chiasmia* species in being barrel-shaped with 10–11 longitudinal ribs; apical region whitish (Figs 1c, 1d). Green when laid, turning dark reddish later. Larva. First instar: length 1.34 mm, width 0.14 mm. Head: width 0.23 mm, pale brown, ocelli darker. Body: dorsal and

ventral aspect dark green, thoracic and last abdominal segments paler; sides paler green. Legs pale whitish-green. Second instar: length 5.77 mm, width 0.6 mm. Head: width 0.6 mm, light green dorsally, with dark brown to black maculae on sides and light green to greenish-yellow on edges of genae. Ocelli dark. Body: medium green, gradually turning yellowish-green caudad; dorsum with 2 dark brown lines from head to A6; sides with 4 white lines through entire length of body. A1–A5 with two and A6–7 with one dark brown spot on side. Ventral aspect green with white median line, bordered by 2 broken, undulating brown-and-green lines on either side. Abdominal legs dark brown. Third instar: length 13 mm, width 0.9 mm. Head: width 0.8 mm, markings as in second instar. Body bright green. Dorsum of thorax with some small, brown spots and two white lines, becoming on abdomen more like a broad band, interspersed with light green and brown. Body laterally with yellowish lines, more or less straight on thorax, zigzagging on abdomen. Thoracic and abdominal legs yellowish, their bases displaying some red-brown maculation, particularly on T3 and A6. Ventral side with yellowish median line, bordered by some brownish spots. Fourth instar: length 17 mm, width 1.4 mm. Head: 1.23 mm, light green, with 2 large, oblong maculae extending on sides of genae. Body light yellowish green; dorsal side with 2 whitish lines on thoracic, and two short, brown streaks per segment on abdominal segments; the streaks become much fainter caudad. A1–A6 laterally with some maculation to the side and below spiracle. Ventral side evenly yellowish-green with white median line. Thoracic and abdominal legs concolorous with body; prolegs on A6 with some patchy, dark maculation. Pupa: cremaster as in Fig. 6e.

DIAGNOSIS. Similar to *Chiasmia observata*, above, but paler, straw-yellow instead of brown. The blackish streaks on the fore wing are straight or nearly so (curved in *observata*). Ssp. *araps* is even more similar, but the two taxa are allopatric. The species is further superficially similar to *Isturgia disputaria* (Guenée).

BIOLOGY. *Chiasmia subcurvaria* occurs in a range of different habitats but is most numerous in frost-free lowveld savanna. In captivity, the larva has been reared on *Acacia karroo* Hayne. In southern Africa, adults are active throughout the year with the exception of June.

DISTRIBUTION (Fig. 1023). Continuously distributed from South Africa to Ethiopia but absent from central and western parts of the continent. Throughout southern Africa, but very localized in Namibia, Botswana, Moçambique and Cape Province. Some specimens from Ethiopia and Kenya are intermediate in wing markings between the nominate subspecies and ssp. *araps*.

MATERIAL. 92♂ (2 dissected, TM genitalia slides No. 981, 10927) and 120♀ (1 dissected, TM genitalia

slide No. 10928). 11 London (BMNH), 2 Vienna (NHW), 12 Munich (ZSBS), 20 Bulawayo (NMBZ), 93 Pretoria (TM), 12 Cape Town (SAM), 2 D.M. Kroon collection, 8 C. Herbule collection, 12 N.J. Duke collection, 10 H.S. Staude collection.

**LOCALITIES.** **South Africa, Transvaal:** [Gauteng]: Pretoria (1). [Northern Province]: Derdepoort (1), Mariepskop (1), Entabeni Forest, Soutpansberg (3), Buzzard Mountain Retreat, Soutpbg. (2), Blouberg, N. side, Glenfernness (1), Wyllie's Poort (4), Kampersrus (1), Harmonie Farm (1), Pietersburg (1), Three Sisters (2), Malta, Ptbg. (3), Kruger National Park: Letaba Camp (1), Punda Milia (11), Nwanedzi (2). [Mpumalanga]: Nelspruit, 800 m (2), Barberton District (3), White River (6), Hectorspruit (1), Waterval Onder (1); Kruger National Park: Matjulwana (2), Skukuza (1). **KwaZulu-Natal:** Durban (22), Pietermaritzburg (1), Mkuze (5), Yellowwoods, Balgowan (3), Umdoni Park (1), Muden (1), Jozini Dam (3), Inanda Mts (1), St. Lucia Bay (3), Umgeni Valley (1), Hluhluwe (30), Eshowe (1), Pinetown (1), Umhloti Beach (1), Umlaas Road (1), Tongaat (1), Ginginhlovu (1), M'fongosi (2). **Free State:** Sasolburg (2). **Cape Province:** [Eastern Cape]: Buffalo Pass (1), Beacon Bay (1), Graaff-Reinet (1), Port St. John's (1). **Swaziland:** Malagwane Hill/Mbabane (1). **Namibia:** Ghaub Valley (1). **Botswana:** Maun (1), Kabulabula, Chobe River (1). **Zimbabwe:** Lundi River (1), Mutare (4), Vumba (6), Victoria Falls, Big Tree (1), Kariba (1), Harare (5), Lowdale (1), Darwendale (1), Bulawayo (3), Khami near Bulawayo (1), Busi Farm, Chippinga (6), Sapi/Zambezi confluente (1), Katambora Rapids, Zambezi (1), Rekomitjie, Zambezi Valley (1). **[Zambia]:** (NE Rhodesia), Middle Luangwa Valley, between Mpamadzi and Lusangazi rivers, 1800 ft (2). **Malawi:** Monkey Bay (1), NW. Lake Nyasa, Florence Bay to Karonga, 1650 ft (1). **Moçambique:** Chiluvo Hills (3), E. of Mt. Chiperone, 2200 ft (1), Ruo Valley, 2000 ft (1). **Tanzania:** Madibira (10). **Kenya:** Kibwezi (1), Taveta (1). **Uganda:** Kampala (1), S. of Lake George, 32–3400 ft (1). **Zaire:** Elisabethville (2), Dungu, Upper Uelle Distr. (2). **Ethiopia:** Dire Daoua (1), Harar, 6500 ft (1). **Not traced:** S[üd] Afrika (Holub) (1).

Populations transitional to ssp. *araps*: **Kenya:** Isiolo (7), Mutha (1).

### 131a. *Chiasmia subcurvaria araps* (Prout, 1926) comb. n.

not illustrated

*Discalma subcurvaria araps* Prout, 1926b: 187. Holotype ♀. **[Saudi Arabia]:** S[outh] Arabia (G.W. Bury); *Tephrinopsis observata* Wlk.; *Discalma subcurvaria araps* Prout ♀ type (BMNH) [exam-

ined]. Paratype (1 ♀). **[Saudi Arabia or Yemen]:** S.W. Arabia, Amiri Country, El Kubar (G.W. Bury) 1903.–164; *Discalma subcurvaria araps* Prout ♀ paratype (BMNH) [examined].

**DIAGNOSIS.** Adult. Compared with the nominate subspecies, the moths are darker brown and have the median black streak on the fore wing very broad and curved.

**DISTRIBUTION.** Ethiopia and Arabia.

**MATERIAL.** 6♂ and 3♀. 2 London (BMNH), 7 C. Herbule collection.

**LOCALITIES.** **[Ethiopia]:** (Abyssinia), Lake Rudolph Expedition, Ketchiba, Aroussi (1), Choa, Debré Zeit, 1800 m (7). **[Saudi Arabia?]:** Arabia, Dhala (1).

### 19. *Chiasmia kirbyi*-group

The eight species included here may not form a monophyletic entity: in facies, they would appear to fall into two groups, 133. *C. kirbyi* to 137. *C. semiolivacea* comprising one, and 138. *C. punctilinea* to 140. *C. costicommata* forming the other. However, characters of the genitalia occur across this delimitation, and it was therefore decided to group them together, based on the presence of a short, cylindrical antrum with rather large diameter in the female genitalia. Distribution is confined to eastern and southern Africa.

Adults of the first 'group' are medium-sized, brownish macarines which resemble e.g. members of the *brongusaria*-group in general wing pattern. The species in the second 'group' are smaller, of greyish colour and have the postmedian line on the fore wing broken into a series of spots.

**MALE GENITALIA** (Figs 711–715). Uncus horns typically small; gnathos also delicate. Costa of valve straight or gently recurved and at most slightly dilated apically; one or two ventral processes present. Sacculus not more than twice width of costa and usually somewhat pointed. Saccus slightly concave. Aedeagus small and of irregular fusiform shape; vesica with or without cornuti; if cornuti are present, these may be single and needle-like or short and stout, occurring in groups. Octavals showing considerable variation in shape.

**FEMALE GENITALIA** (Figs 932–939). Lamella postvaginalis of sterigma forming rather small sclerotizations which may, however, become extensive (140. *costicommata*). Antrum in most species comparatively short and wide. This appears to be a groundplan character of Macariini as it also occurs e.g. in the Palaearctic type species of *Macaria*, *liturata* (Clerck). Bursa copulatrix pear-shaped; signum well developed.

## Key to species

- 1 Small to medium-sized (fw length 10–14 mm), grey species (Figs 438–442). ♂ genitalia as in Figs 713–715, ♀ genitalia as in Figs 937–939 ..... 2
- Slightly larger (fw length 13–16 mm), ochreous or brown species (Figs 430–437). ♂ genitalia, where known (Figs 711, 712) and ♀ genitalia (Figs 932–936) not as above ..... 4
- 2(1) Medium-sized, dark grey species with prominent dotted postmedian line (Figs 440, 441). ♂ genitalia (Fig. 714) with a single ventral process, situated low on costa; octavals shallow. ♀ genitalia (Fig. 938) as illustrated, with very wide ductus bursae and small signum. Tanzania, Uganda and Ethiopia .....  
..... 138. *dentilineata* (Warren), p. 243
- Smaller, light grey species with less prominent dotted postmedian line (Figs 438, 439, 442). ♂ (713, 715) and ♀ genitalia (Figs 937, 939) not as above. Southern Africa ..... 3
- 3(2) Small moths (fw length 10–12 mm) (Fig. 442). ♂ genitalia (Fig. 715) with a single digitate process situated high on costa; octavals furcate, deeply excised. ♀ genitalia (Fig. 939) elongated, with crescentic sterigma. Zimbabwe and Kenya .....  
..... 139. *costicomma* (Prout), p. 244
- Medium-sized moths (fw length 12–14 mm) (Figs 438, 439). ♂ genitalia (Fig. 713) with two acutely pointed processes on costa (cf. condition in *C. crassata*, below); octavals very shallow. ♀ genitalia (Fig. 937) less elongated, without crescentic sterigma. Mostly southern Africa (western Transvaal and Free State, Namibia, Botswana, western Zimbabwe, Angola); Tanzania .....  
..... 137. *punctilinea* (Prout), p. 242
- 4(1) Light brown species (Figs 430–432). ♂ genitalia, where known, with a single ventral process on costa (Fig. 711). ♀ genitalia as in Figs 932, 933. Southern Africa ..... 5
- Dark brown, greyish-brown or ochreous species (Figs 433–437). ♂ genitalia, where known, with a pair of acutely pointed ventral processes on costa (Fig. 712). ♀ genitalia very similar to above, as in Figs 934–936. Southern and eastern Africa ..... 6
- 5(4) Adult as in Figs 430, 431. ♂ genitalia (Fig. 711) with long and slightly recurved costa, bearing a single ventral process; octavals rounded, deeply excised. ♀ genitalia (Fig. 932) with posterior margin of sterigma terminating in two short processes. Transvaal, KwaZulu-Natal and Swaziland .....  
..... 132. *kirbyi* (Wallengren), p. 239
- Adult as in Fig. 432. ♂ unknown. ♀ genitalia (Fig. 933) with sterigma smaller, not terminating in two such processes. Northern Transvaal .....  
..... 133. *vau* (Prout), p. 240
- 6(4) Ochreous, broad-winged moths with olive suffusion in postmedian area (Fig. 437). ♂ unknown. ♀ genitalia (Fig. 936) with small corpus bursae and sterigma as illustrated. Zimbabwe .....  
..... 136. *semiolivacea* sp. n., p. 242
- Greyish-brown or dark brown species (Figs 433–436). ♂ genitalia, where known, with paired ventral process on costa (Fig. 712). ♀ genitalia as in Figs 934, 935, with bursa copulatrix differently shaped. One species widely distributed, including Zimbabwe; one species restricted to Tanzania ..... 7
- 7(6) Greyish-brown moths (Figs 435, 436): ♂ with prominent, dark median fascia. ♂ genitalia (Fig. 712) with paired, acutely pointed ventral processes on costa; octavals shallow. ♀ genitalia (Fig. 935) with smaller bursa copulatrix and ductus widening abruptly into corpus bursae. Northern Transvaal through Zimbabwe to Zambia and Malawi; East Africa (Rwanda, Tanzania); Angola; Zaire .....  
..... 135. *crassata* (Warren), p. 241
- Dark brown moths (Figs 433, 434); ♂ unknown. ♀ genitalia (Fig. 934) with larger bursa copulatrix and gradual transition from ductus to corpus bursae. Tanzania ..... 134. *morogoro* sp. n., p. 241

### 132. *Chiasmia kirbyi* (Wallengren, 1875) comb. n.

Figs 430, 431; 711, 932; 1025

*Macaria kirbyi* Wallengren, 1875: 121. Holotype ♀, [South Africa]: Transvaalia, Afr[ica] merid[ionalis]; *Macaria kirbyi* Wallgr.; 1993.518 (UZIL) [examined]. See Remarks.

*Gonodela* [sic] *distinguenda* Warren, 1897a: 106. LECTOTYPE ♂, here designated, [South Africa, KwaZulu-Natal]: Weenen, Natal; *Gonodela* [sic] *distinguenda* Warr. ♂ type; Rothschild Bequest B.M.1939-1 (BMNH) [examined]. Paralectotype (1♀). [South Africa]: same data as holotype (BMNH) [examined].

[*Macaria costiguttata* (Warren); Janse, 1917: 113. Misidentification.]

*Macaria distinguenda* (Warren); Janse, 1917: 113 (noted as probable synonym of *kirbyi*).

*Macaria kirbyi* Wallengren; Janse, 1917: 113.

*Semiothisa kirbyi* (Wallengren); Janse, 1932: 233.

*Gonodela* [sic] *distinguenda* Warren; Janse, 1932: 233 (synonymy).

[*Semiothisa costiguttata* (Warren); Janse, 1932: 229. Misidentification.]

FORE WING LENGTH. 13–15 mm (♂), 14–16 mm (♀).

ADULT (Figs 430, 431). Fairly large. Ground colour of wings off-white, thickly dusted with grey-brown to brown. Females darker, more brown in general appearance than the rather greyish males. Basal line moderately well developed on fore wing, absent on hind wing; median line faint to well developed, more like a fascia.

6(4) Ochreous, broad-winged moths with olive suffu-

Postmedian line prominent, fine, slightly angulated and sharply angled below costa of fore wing. Preapical spot present, dark brown. Discal spots inconspicuous. Postmedian area darker, usually with some dark maculation. Underside: coloration similar to upperside, lines fainter. Vestiture of thorax and abdomen greyish-ochreous. Hind tibia of ♂ not modified. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 711). Uncus horns fairly small; gnathos normal. Costa of valve elongated and slightly recurved, not dilated apically. A single, large ventral process present. Sacculus somewhat square, pointed. Aedeagus short and fusiform; vesica with a single, long, needle-like cornutus. Octavals large, horseshoe-shaped.

**FEMALE GENITALIA** (Fig. 932). Papillae anales narrow. Apophyses posteriores long and slender; a. anteriores markedly stouter, about two-thirds length of former. Sterigma: l. postvaginalis forming elaborate sclerotizations. Antrum short and cylindrical, wide-mouthed. Ductus bursae long, ribbed over most of its surface. Corpus bursae small, rounded. Signum large, crescentic.

**DIAGNOSIS.** Together with the two following species easily identified on account of its size and dark brown or brownish-grey colour. 135. *C. crassata* is similar but more greyish in coloration. While the male genitalia of *C. vau*, below, are not known, the ♂ of *C. crassata* has the cornutus much longer and thinner than *C. kirbyi*. The female genitalia of the three species can easily be told apart using the differences in the structure of the sterigma (compare Figs 932–934).

**BIOLOGY.** *Chiasmia kirbyi* is a savanna species and most widespread on the Transvaal highveld. Adults have been collected from January to May and from September to December.

**DISTRIBUTION** (Fig. 1025). Restricted to South Africa and recorded from the Transvaal, KwaZulu-Natal (including the former Transkei) and Swaziland. There exists a single doubtful record from Cape Town.

**MATERIAL.** 56♂ (5 dissected, TM genitalia slides No. 965, 966, 979, 10873, 10875) and 79♀ (1 dissected, TM genitalia slide No. 10874). 107 Pretoria (TM), 1 Pretoria (SANC), 3 Cape Town (SAM), 6 N.J. Duke collection, 2 D.M. Kroon collection, 16 H.S. Staude collection.

**LOCALITIES.** **South Africa, Transvaal:** [Gauteng]: Pretoria (47), Silverton (1), Magaliesberg (9), Krugersdorp (4), Strubens Valley, Roodepoort (1), Suikerbosrand Nature Reserve (4). [Northern Province]: Groenvlei (1), Blyde River Nature Reserve (1), Minastune (2), Ohrigstad (1), Mt. Sheba (1), Lekkerwater (1), Woodbush Village (1), Punda Milia (1), Farm Warmberg/Chuniespoort (1), Klein Sand

River Valley 30 km N. Nylstroom (1), Potgietersrus (1). [North-West]: Rustenburg (12), Hennops River (1), Gloster Game Farm (2). [Mpumalanga]: Barberton (7), Pongola River (1), Laersdrif, Middelburg District (1), Louws Creek (2), Waterval Onder (5), Lydenburg, Blouhoogte (1). Not traced: van der Merwe Station (6).

**Free State:** Sasolburg (2). **KwaZulu-Natal:** Krantzkloof (1), Durban (1), New Hanover (2), M'fongosi (1). **Cape Province:** [Western Cape]: Cape Town (1). Ambiguous: Rietfontein/Verona (1). [Eastern Cape]: Port St. John's (1), Umtata (1), Bashee (1), Panza (1), Emjanyana (1). **Swaziland:** Malagwane Hill/Mbabane (3).

**REMARKS.** The original description is said to be based on a ♂ specimen; this appears to be erroneous as the type specimen received from Lund Museum is a ♀.

### 133. *Chiasmia vau* (Prout, 1913) comb. n.

Figs 432; 933; 1025

*Macaria vau* Prout, 1913: 217. Holotype ♀, [South Africa, Northern Province]: Thabina, Zoutp[ans]b[erg] Distr[ict], 13.11.[19]05 (C. Swierstra); 495. unicum; *Macaria vau* Prout type; 10.497; *Macaria vau* Prout Type No. 2411; TM Lep[idoptera] Het[erocera] Genitalia slide No. 10993 (TM) [examined].

*Macaria vau* Prout; Janse, 1917: 114.

*Semiothisa vau* (Prout); Janse, 1932: 231.

**FORE WING LENGTH.** 14 mm (♀ holotype).

**ADULT ♀** (Fig. 432). Ground colour of wings pale ochreous, dusted with grey. Postmedian area darker, irregularly marked with grey; a dark spot present near anal angle of hind wing and level with discal cell on fore wing. All lines faint, postmedian curved, not angled on fore wing. Discal spots prominent, blackish. Underside whitish with grey-brown dusting in basal and median areas. Discal spots well developed. Postmedian area dark brown, with lighter blotches along termen. Body ochreous with grey dusting.

**FEMALE GENITALIA** (Fig. 933). Papillae anales pointed. Both pairs of apophyses slender, a. anteriores about two-thirds length of a. posteriores. Sterigma forming a continuous transverse sclerotization across ostium. Antrum short and cylindrical. Bursa copulatrix pear-shaped, with long, strongly ribbed ductus and rounded, membranous corpus. Signum large, circular.

**DIAGNOSIS.** The unique holotype resembles *C. kirbyi*, but is smaller and has the postmedian line weaker and less sharply angled on fore wing. In the female genitalia, the best character for separating *C. kirbyi*, *crassata* and *vau* is the structure of the sterigma (compare Figs 932, 933).

**BIOLOGY.** The holotype female was collected in November in the mountainous Soutpansberg area in northern Transvaal, most likely in a savanna habitat.

**DISTRIBUTION** (Fig. 1025). Known from a single specimen, collected in the Zoutpansberg Range, northern Transvaal. The species has not been observed since 1905, and its present status is unknown.

**MATERIAL.** Known from the holotype only.

### 134. *Chiasmia morogoro* sp. n.

Figs 433, 434; 934

**TYPE MATERIAL.** Holotype ♀, [Tanzania]: D[eutsch] O[st] Afrika, Morogoro (Reuss S.G.); 845; *Semiothisa tattaria* Swin. Trans. Ent. Soc. 1904 [site] 508 [misidentification]; Genitalia slide M. Krüger No. 5 (ZMHB).

**FORE WING LENGTH.** 14 mm (♀ holotype).

**ADULT ♀** (Figs 433, 434). Of medium size. Ground colour of wings cream white, densely irrorated with brownish-grey. Postmedian area wholly suffused with brownish-grey except for a pale blotch at apex of fore wing. Basal line absent; median present but indistinct; postmedian fine, obliquely angled below costa of fore wing. Preapical spot faint; discal spots well developed. Underside similar; distal half of postmedian area slightly paler than proximal half, mixed with some white. Vestiture of thorax and abdomen concolorous with wings, lighter on underside.

**FEMALE GENITALIA** (Fig. 934). Papillae anales small and rounded. Both pairs of apophyses rather stout; a. anteriores about two-thirds length of a. posteriores. Sterigma with l. postvaginalis forming medium-sized sclerotizations, flanking the short and cylindrical antrum. Bursa copulatrix large and pear-shaped, with gradual transition between the ribbed ductus and the membranous corpus bursae. Signum well developed, circular.

**DIAGNOSIS.** Males of *Chiasmia crassata*, below, are similar but have a more strongly pointed fore wing apex. In the absence of males, the position of this new species in this group rests solely on the strong similarity of the female genitalia with those of the preceding species.

**DISTRIBUTION.** Tanzania.

**ETYMOLOGY.** Named after the type locality.

### 135. *Chiasmia crassata* (Warren, 1897) comb. n.

Figs 435, 436; 712, 935; 1026

*Peridela crassata* Warren, 1897a: 110. LECTOTYPE ♂, here designated, [Zambia]: Mpeta, Loangwa R[iver], affl[uent] of Zamb[ez]i, XI–XII [18]95, B[eginning] of raining s[eason](Coryndon); *Peridela crassata* Warr. ♂ type; Rothschild Bequest B.M. 1939–1 (BMNH) [examined]. Paralectotype (1 ♀). [Zambia]: same data as holotype (BMNH) [examined].

*Macaria crassata* (Warren); Hampson, 1910: 467.

*Peridela crassata* Warren; Janse, 1917: 112.

*Tephrina benguellae* Prout, 1928a: 68. Holotype ♂, [Angola]: Talala, Benguella, 1. Dec[ember] 1905 (Dr. Ansorge); *Tephrina benguellae* Prout ♂ type; Rothschild Bequest B.M. 1939–1 (BMNH) [examined]. **Syn. n.** Paratypes (8♂, 2♀). [Angola]: 2♂, same data as holotype; 6♂, 1♀, Batt, Benguella, 29. Nov[ember] 1905 (Dr. Ansorge) (1♂ dissected, Geometridae genitalia slide No. 16921) (BMNH); 1♀, F[or]t Quilenges, Benguella, 7. Jan[uary] 1905 (Dr. Ansorge) (dissected, Geometridae genitalia slide No. 16922) (BMNH) [examined].

*Peridela crassata* Warren; Janse, 1932: 234 (under species auctorum).

**FORE WING LENGTH.** 14–15 mm (♂), 16 mm (♀).

**ADULT** (Figs 435, 436). Ground colour of wings whitish, thickly irrorated and suffused with greyish-brown, particularly in postmedian area. Basal line weak and usually absent on hind wing; median very prominent and more like a fascia. Postmedian line well developed, sharply defined, angled on fore wing. Discal spots well developed but obscured by median line. Postmedian area virtually uniformly greyish-brown, except for whitish suffusion on apex of fore wing and near anal angle of hind wing. A conspicuous, black, wedge-shaped blotch near tornus of hind wing and a smaller, round blotch in postmedian area of fore wing, more weakly developed or absent in ♀, which is also less clearly marked than ♂. Underside: basal and median areas whitish, thickly irrorated with greyish-brown; median line moderately well developed, discal spots conspicuous. Proximal half of postmedian area wholly brownish; distal half whitish, irrorated and suffused with brown. Thorax and abdomen greyish-brown. Hind tibia of ♂ somewhat dilated. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 712). Uncus horns and gnathos small. Valves prominent. Costa elongated, curved and dilated apically, exhibiting two acutely pointed ventral processes. Sacculus small and pointed. Aedeagus small relative to size of genitalia, tapering anteriorly. Vesica bearing a broadly triangular, blade-like median cornutus and with a group of microcornuti near apex. Octavals rather shallow, well sclerotized and with most of surface scobinate.

**FEMALE GENITALIA** (Fig. 935). Papillae anales nar-

row. Apophyses normal, a. anteriores less than half length of a. posteriores. Antrum short and cylindrical, flanked by kidney-shaped sclerotizations formed by l. postvaginalis. Bursa copulatrix with long and wide, ribbed ductus and small and rounded, membranous corpus. Signum prominent, circular.

**DIAGNOSIS.** Males are similar to 75. *C. geminilinea* and, to a lesser degree, *C. kirbyi*. They are, however, readily identified by the paired, acutely pointed ventral processes on the costa.

**BIOLOGY.** Apparently associated with frost-free savanna. Adults have been collected from November to January.

**DISTRIBUTION** (Fig. 1026). From the northernmost Transvaal through Zimbabwe to Zambia and Malawi; East Africa (Rwanda, Tanzania); Angola; Zaire.

**MATERIAL.** 36♂ (1 dissected, TM genitalia slide No. 10876) and 21♀ (1 dissected, TM genitalia slide No. 10877).

2 London (BMNH), 6 Munich (ZSBS), 2 Nairobi (NMKE), 9 Bulawayo (NMBZ), 21 Pretoria (TM), 7 C. Herbulot collection, 10 N.J. Duke collection.

**LOCALITIES.** **South Africa, Northern Province:** Punda Milia (12), Levubu (4). **Zimbabwe:** Mutare (Umtali) District (5), Penhalonga, Umtali District (1), Lowdale [Farm], Mazoe Valley (10), Salisbury (2), Mazvikadei Dam/Basket (1), Christon Bank (1), Sinoia (2). **Malawi:** Lilongwe, Capital Hotel (4). **Zambia:** Kitwe (2). **Tanzania:** no further data (1), Madibira (4), Mpanda, Sibwesa (1), Mpata (2). **Zaire:** (Belgian Congo), Elisabethville (1), 150–200 miles W of Kambove (1). **Rwanda:** SE., Rusumo, 1300 m (3).

### 136. *Chiasmia semiolivacea* sp. n.

Figs 437; 936; 1026

**TYPE MATERIAL.** Holotype ♀. [Zimbabwe]: (Southern Rhodesia), Lowdale, 11.10.[19]69 (A.J. Duke); ex collection A.J. Duke, donated March 1982; TM Lep[ido]ptera Het[erocera] genitalia slide No. 11057 (TM).

**FORE WING LENGTH.** 16 mm (♀ holotype).

**ADULT ♀** (Fig. 437). A broad-winged species. Ground colour of wings pale ochreous, striated with olive in basal and median areas and suffused with olive in postmedian area. Basal and median lines virtually absent, median line poorly developed. Discal spots ochreous and inconspicuous on fore wing, black on hind wing. Underside pale ochreous, speckled with brown, postmedian area with a broad brown fascia bordering postmedian line. Discal spots well developed, brown. Vestiture of thorax and abdomen concolorous with wings, ochreous.

**FEMALE GENITALIA** (Fig. 936). Papillae anales rather large. Both pairs of apophyses slender, a. anteriores about two-thirds length of a. posteriores. Sterigma: l. postvaginalis forming medium-sized sclerotizations next to the short, cylindrical antrum. Bursa copulatrix elongated, with long, strongly ribbed ductus bursae and somewhat elliptical, membranous corpus. Signum large, circular.

**DIAGNOSIS.** *Chiasmia semiolivacea* is unlikely to be confused with any other Afro-tropical species of *Chiasmia*, although the female genitalia suggest a close relationship to the other species of the group.

**DISTRIBUTION** (Fig. 1026). So far only known from the type locality, Lowdale in Zimbabwe.

**BIOLOGY.** The female holotype was collected in October, suggesting an appearance early in the season.

**ETYMOLOGY.** From Latin *semi-*, half, and *olivaceus* (-a, -um), olive-coloured; the reference is to the olivaceous postmedian area of the fore wing.

### 137. *Chiasmia punctilinea* (Prout, 1917) comb. n.

Figs 438, 439; 713, 937; 1026

*Peridela punctilinea* Prout, 1917b: 69. Holotype ♂. [Botswana]: Marshall/Bechuanaland, Gaborone 1916; *Peridela punctilinea* Prout ♂ type; 9.; Type: Type. (SAM) [examined]. Paratypes (2♂). [Namibia or Angola]: Ovampoland [sic] (BMNH) [not examined].

*Peridela punctilinea* Prout; Prout, 1925: 19.

*Semiothisa punctilinea* (Prout); Janse, 1932: 221.

**FORE WING LENGTH.** 12–14 mm (both sexes).

**ADULT** (Figs 438, 439). Ground colour of wings whitish, thickly irrorated with grey, particularly postmedian area. Basal line weakly developed on fore wing, absent on hind wing. Median line reasonably well developed on fore wing in ♂, frequently absent in ♀. Postmedian line mostly well developed, fine, angled below costa of fore wing and usually broken into a line of dots. Discal spots small, black, rather inconspicuous. Underside whitish, thickly irrorated with brownish-grey. Lines and discal spots ranging from well developed to virtually absent. Postmedian area brown, with lighter suffusion towards termen. Hind tibia of ♂ dilated. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 713). Uncus horns very small; gnathos normal, deeply emarginate. Costa of valve curved, exhibiting two acutely pointed ventral processes. Valvula indicated by sclerotized elevation. Sacculus small and pointed. Aedeagus small, tapering anteriorly; vesica with a short and stout median cornutus and a patch of microcornuti below apex. Octavals very shallow, distal margin weakly concave.

FEMALE GENITALIA (Fig. 937). Papillae anales pointed. Apophyses moderately stout, a. anteriores two-thirds length of a. posteriores. Sterigma: l. postvaginalis forming rounded sclerotizations flanking the short, cylindrical antrum. Bursa copulatrix rather short, pear-shaped; transition between ribbed ductus and membranous corpus gradual. Signum fairly prominent, circular.

DIAGNOSIS. An inconspicuous grey species that is not likely to be confused with other African *Chiasmia*. 139. *C. costicommata*, below, is not unsimilar, but always smaller and can be recognized by the presence of three black maculae along the costa of the fore wing. The postmedian line, which is dissolved into a row of black dots in *C. punctilinea*, is characteristic.

DISTRIBUTION (Fig. 1026). Most records are from southern Africa, where the species occurs in the drier parts of the Transvaal and Free State, Namibia, Botswana and western Zimbabwe. Single records exist from Angola and Tanzania.

BIOLOGY. *Chiasmia punctilinea* is associated with dry savanna. Adult specimens were mostly recorded from December to February, with single specimens in October and March.

MATERIAL. 41♂ (3 dissected, TM genitalia slides No. 10848, 10849; genitalia slide L 668) (NMBZ) and 11♀ (2 dissected, TM genitalia slides No. 10850, 11231). 27 Pretoria (TM), 2 Cape Town (SAM), 18 Bulawayo (NMBZ), 2 C. Herbule collection, 3 D.M. Kroon collection.

LOCALITIES. South Africa, Transvaal: [Mpumalanga]: Barberton (1). [Gauteng]: Pretoria (1). [North-West]: Rustenburg (2). [Northern Province]: Pentonville, 60 m N. Vaalwater (1). Free State: Bloemfontein (1). Namibia: Farm Ojtiseva, Windhoek District (1), Farm Valencia 42, Windhoek District (1), Ghaub Valley (3), Tiger Valley (3), Grootfontein (2), Kamanjab, Outjo District (1), Diyona Camp, Okavango (1), Andara, Okavango (2), Bagani (2), Caprivi, Nakatwa Camp, Lianshulu, Kwando (1), Kavango, Popa Rapids (1), Omuramba Mpungu, Okavango (1). Angola: Humbe, 1200 m (2). Botswana: 8 m N. Maun (1), 20 km W. Maun, Lake Ngami Road (1), 32 km S. Kang (5), Mafa (1), Sepopa, Ngamiland (1), Four River Camp, Okavango (2). Zimbabwe: Umgusa Forest, Sawmills (6), Wankie (3), Ingwesi, Syringa (1), Lunga River, 25 m SSE. Bulawayo, nr Essev Vale (1), Delaware Ranch, Matetsi (1), Katambora Rapids, Zambezi (1). Tanzania: Morogoro (1).

### 138. *Chiasmia dentilineata* (Warren, 1899) comb. n.

Figs 440, 441; 714, 938

*Tephritis dentilineata* Warren, 1899b: 309.  
LECTOTYPE ♂, here designated, [Uganda]: Masindi, 26.IV.[18]97 (Dr Ansorge); *Tephritis dentilineata* Warr. Type ♂; Rothschild Bequest B.M. 1939-1 (BMNH) [examined]. Paralectotypes (3♂). [Uganda]: 2♂, *ibidem*, dated 23.IV.1897 and VI.1897; 1♂, Katagrakwa River, V.1897 (Dr Ansorge); Geometridae genitalia slide No. 16153 (BMNH) [examined].

FORE WING LENGTH. 14 mm (both sexes).

ADULT (Figs 440, 441). Ground colour of wings whitish, but appearing dark grey due to intense dusting with blackish scales. Termen of hind wing rounded. Basal and median lines quite inconspicuous, postmedian line more prominent, zigzagging. Discal spots blackish. A blackish dot near anal angle of hind wing and in postmedian area of fore wing. Underside lighter, whitish grey, with well developed postmedian line and broad terminal shade. Vestiture of thorax and abdomen grey. Hind tibia of ♂ dilated, bearing hair-pencil. Setal comb on A3 present.

MALE GENITALIA (Fig. 714). Uncus horns small; gnathos normally developed. Costa of valve sturdy, bearing a single process close to base; sacculus small and rounded. Aedeagus short and somewhat fusiform, with a well sclerotized tip and a small, finely spinose area around apex. Octavals rounded, with broadly w-shaped distal margin.

FEMALE GENITALIA (Fig. 938). Papillae anales medium-sized. Both pairs of apophyses slender, a. anteriores rather more than two-thirds length of a. posteriores. Sterigma with wrinkled texture. Antrum not discernible in preparation examined. Ductus bursae membranous, very wide; corpus small and rounded, bearing a small signum.

DIAGNOSIS. Characterized by its pure grey coloration in combination with its size; *C. punctilinea* is somewhat similar in markings, but always smaller. In addition, the two species are allopatric.

BIOLOGY. Adults have been collected from April to July.

DISTRIBUTION. East Africa, with records from Tanzania, Uganda and Ethiopia.

MATERIAL. 6♂ and 2♀ (1 dissected, Geometridae genitalia slide No. 16154) (BMNH). 3 London (BMNH), 5 Nairobi (NMKE).

LOCALITIES. Tanzania: Maboroni, Nandi (1). Uganda: Masindi (1), Bwamba (5). Ethiopia (Abysinia), without further data (1).

**139. *Chiasmia costicommata* (Prout, 1922)**  
comb. n.

Figs 442; 715, 939; 1027

*Macaria costicommata* Prout, 1922a: 174. Holotype ♂, [Zimbabwe]: Rhod[esia], Umvuma (A.J.T. Janse) [printed], Carnegie 12 [19]18 [handwritten]/ *Semiothisa costicommata* Prout, type No. 2209/ *Macaria costicommata* Prout ♂ type (TM) [examined].

*Semiothisa costicommata* (Prout); Janse, 1932: 223.

FORE WING LENGTH. 10–11 mm (♂), 11–12 mm (♀).

ADULT (Fig. 442). Small. Ground colour of wings whitish, thickly striated with mouse-grey. Lines ranging from well developed to virtually absent; three blackish maculae on fore wing where lines meet the costa. Discal spots very small or absent. Underside: irroration less dense compared with upperside, therefore appearing more mottled. Markings as on upperside. Thorax and abdomen light grey. Hind tibia of ♂ dilated. Seta comb on A3 absent.

MALE GENITALIA (Fig. 715). Uncus horns very small; gnathos delicate. Costa of valve robust, not dilated apically and bearing a single, long, blunt ventral process. Sacculus small and pointed. Tegumen plus vinculum massive, somewhat rectangular. Aedeagus short and stout, with pointed tip; vesica without cornuti. Octavals deeply furcate.

FEMALE GENITALIA (Fig. 939). Papillae anales medium-sized. Both pairs of apophyses moderately long, slender. Sterigma crescentic. Antrum medium-sized. Bursa copulatrix elongated. Membranous part of ductus bursae long, ribbed, gradually widening into the pear-shaped corpus. Signum large, with numerous spicula.

DISTRIBUTION (Fig. 1027). Zimbabwe, with a single record from Kenya.

BIOLOGY. *Chiasmia costicommata* is an apparently rare species associated with savanna habitats. Adults were collected in October, December and January.

MATERIAL. 28♂ (2 dissected, TM genitalia slides No. 964, 10976) and 19♀ (1 dissected, TM genitalia slide No. 10977). 4 London (BMNH), 4 Nairobi (NMKE), 7 Pretoria (TM), 24 Bulawayo (NMBZ), 8 N.J. Duke collection.

LOCALITIES. **Zimbabwe:** Bulawayo (7), Harare (Salisbury) (6), Sawmills (2), Selukwe (1), Christon Bank (1), Nyamadzi River, Mutare District (2), Lowdale (1), Lake McIlwaine (1), Gatooma Research Station (1), Khami/Bulawayo (11), Matsheamhlope/Bulawayo (9), Marandellas (1), Mtshabezi Valley, Matopos (1). **Kenya:** Makabete, Machakos (2), Muani, Ukamba (1).

**20. *Chiasmia brongusaria*-group**

This large group comprises eleven mostly medium-sized species of usually ochreous or brown coloration. The fore wings are comparatively broad; the termen of the hind wing is always well rounded. The apomorphy defining the group is provided by the sterigma, which forms small, rounded and somewhat walnut-shaped sclerotizations. The centre of distribution of the group is in the savannas of southern and eastern Africa, although several endemic species inhabit the savannas of the northern and western parts of the region.

MALE GENITALIA (Figs 716–724). Uncus horns small to medium-sized; in one species (*C. tristis*) two pairs of horns present. Gnathos typically deeply emarginate with massive centre but delicate arms. Costa of valve straight to slightly curved and usually somewhat dilated apically and with a single, mostly pointed process present; a few species with some serrations or a small second process. Valvula absent. Sacculus not large, rounded, and inner margin usually well chitinized. Aedeagus stout and fusiform, in most species with a rather short median cornutus and a small spinose area at or close to tip. Octavals mostly with shallow cleft, but occasionally deeply emarginate (e.g., *C. assimilis*, Fig. 722).

FEMALE GENITALIA (Figs 940–950). General aspect elongated. Papillae anales narrow; apophyses also not very strongly developed. Antrum well developed. Sterigma (l. postvaginalis) forming highly characteristic walnut- or brain-shaped sclerotizations on sides of antrum. Bursa copulatrix pyriform or taking the shape of an elongated tube. Signum very small to medium-sized.

**Key to species**

- |      |  |
|------|--|
| 1    | Very dark moths (Fig. 453). ♂ genitalia (Fig. 719) with two pairs of uncus horns; ♀ genitalia (Fig. 944) elongated, with very small signum. North-western Cape Province and Namibia.....   |
|      | ..... 144. <i>tristis</i> sp. n., p. 249   |
| —    | Paler, mostly ochreous moths (Figs 443–452, 454–464). ♂ genitalia with a single pair of uncus horns; ♀ genitalia not as in Fig. 944 and mostly less elongated. Widely distributed in study area ..... 2  |
| 2(1) | Medium-sized (fw length 13–16 mm), ochreous to brown moths with characteristic wing pattern (Figs 454–456). ♂ genitalia (Fig. 720) with tegumen appearing swollen; octavals very shallow. ♀ genitalia elongated (Fig. 945). Southern parts of Free State, central and western Cape Province; central Namibia ..... |
|      | ..... 145. <i>castanea</i> sp. n., p. 250  |
| —    | Moths with different wing pattern, frequently  |

- paler. ♂ and ♀ genitalia not as in Figs 720, 945. Distribution may overlap ..... 3
- 3(2) Small species (fw length 12–13 mm); adults as in Figs 451, 452. ♂ and ♀ genitalia as in Figs 717, 718 and 942, 943. Distribution confined to northern subsaharan Africa ..... 4
- Larger species or, if of similar size, then adults not as in Figs 451, 452 and genitalia not as in Figs 717, 718 and 942, 943. Eastern and southern Africa ..... 5
- 4(3) ♂ genitalia (Fig. 717) with valve appearing very large in relation to remainder of genitalia; octavals fairly close together. ♀ genitalia as in Fig. 942; corpus bursae narrow. Mauritania, Sudan, Nigeria, N. Cameroon ..... 142. *sudanata* (Warren & Rothschild), p. 248
- ♂ genitalia (Fig. 718) with valve appearing less large; octavals further separated than in *sudanata*. ♀ genitalia as in Fig. 943; corpus bursae broader. Senegal ..... 143. *senegambiensis* sp. n., p. 249
- 5(3) Small (fw length 11–13 mm), pale ochreous moths with very faint markings (Fig. 457). ♂ genitalia (Fig. 721) with narrow sacculus and elongated aedeagus; ♀ genitalia (Fig. 946) resembling an elongated tube. Southern Africa; ssp. *pertaesa* in Tanzania, Kenya ..... 146. *inconspicua* (Warren), p. 251
- Mostly larger and always darker moths (Figs 443–450, 458–464). ♂ and ♀ genitalia not as in Figs 721 and 946. Widely distributed in study area ..... 6
- 6(5) Small (fw length 11–14 mm), ochreous-brown moths with relatively narrow fore wings and slightly crenulated hind wings (Figs 459–461). ♂ genitalia (Fig. 722) with deeply excised octavals; ♀ genitalia (Fig. 948) as illustrated. Southern Africa; Zaire; Cameroon; Tanzania; Kenya; Somalia ..... 148. *assimilis* (Warren), p. 252
- Moths, if of similar size, with broader fore wings and rounded hind wings (Figs 443–450, 458, 462–464). ♂ and ♀ genitalia not as in Figs 722, 948. Widely distributed in study area ..... 7
- 7(6) Small (fw length 12 mm), vividly yellowish-ochre moths with pointed fore wings (Fig. 458). ♂ unknown. ♀ genitalia (Fig. 947) with well developed, shell-shaped antrum and small sterigma. Tanzania ..... 147. *androphoba* sp. n., p. 252
- Smaller to larger species (fw length 10–17 mm), ochreous to brownish, with less pointed fore wings (Figs 443–450, 462–464). ♂ genitalia (Figs 716, 723, 724) with or without serration above ventral process. ♀ genitalia pear-shaped (Figs 949, 950), with strongly elongated antrum, or as in Figs 940, 941. Throughout African mainland ..... 8
- 8(7) Relatively large (fw length 15–16 mm), ochreous moths (Fig. 464). ♂ genitalia (Fig. 724) with costa serrated above ventral process; ♀ genitalia (Fig. 950) with very long antrum. Zaire, Zambia, Malawi, Moçambique, Zimbabwe and Botswana ..... 150. *ammodes* (Prout), p. 254
- Mostly smaller, less vividly ochreous moths (Figs 443–450, 462, 463). ♂ genitalia, where known (Figs 716, 723), without serrated costa and ♀ genitalia, where known (Figs 940, 941, 949), with shorter antrum. Throughout study area ..... 9
- 9(8) Smaller (fw length 10–15 mm), ochreous to brown moths (Figs 462, 463), resembling *C. ammodes*. ♂ genitalia as in Fig. 723; ♀ genitalia with antrum as in Fig. 949. East (Sudan, Ethiopia, Uganda to Tanzania) and West Africa (Nigeria, Cameroon) ..... 149. *maculosa* (Warren), p. 253
- Smallish to fairly large species (fw length 12–17 mm) (Figs 443–450). ♂ and ♀ genitalia, where known, as in Figs 716 and 940, 941. Widely distributed in study area ..... 10
- 10(9) Large (fw length 17 mm), broad-winged species (Fig. 450). ♂ unknown. ♀ genitalia (Fig. 941) tubular, widest posteriorly. Kenya ..... 141. *imitatrix* sp. n., p. 248
- Fairly small to equally large moths (fw length 12–17 mm) (Figs 443–449). ♂ genitalia as in Fig. 716). ♀ genitalia (Fig. 940) rather pyriform, widest anteriorly. Widely distributed in Afrotropical region ..... 140. *brongusaria* (Walker), p. 245

#### **140. *Chiasuia brougusaria* *brongusaria* (Walker, 1860) comb. n.**

Figs 443–447; 716, 940; 1028

*Epione? brougusaria* Walker, 1860: 123. Holotype ♀.

**South Africa:** Type; S[outh] Africa; 14. *Epione?* *brougusaria* (BMNH) [examined].

*Tephrina incessaria* Walker, 1861: 962. Holotype ♀.

**[South Africa]:** Cape/42 17; 1734.; 31. *Tephrina incessaria*; Geometridae genitalia slide No. 9626 (BMNH) [examined].

*Tephrina executaria* Walker, 1861: 968. Holotype ♂,

**[Sine patria]:** 373; 42. *Tephrina executaria* (BMNH) [examined].

*Phasiane? miliaria* Felder & Rogenhofer, 1874: pl.

129, Fig. 6. Holotype ♂, [South Africa, Eastern Cape]; Graham[stown ?]; 211; Novara CXXX f.6

*Phasiane miliaria* Afr[ica] m[eridionalis] ♂; Rothschild Bequest B.M. 1939–1; Geometridae genitalia slide No. 9685 (BMNH) [examined].

*Tephritis incessaria* Walker; Wallengren, 1875: 122 (as good species); Swinhoe, 1904: 512 (synonymy); Janse, 1932: 228 (as synonym of *brongusaria*).

*Gonodela* [sic] *brongusaria* (Walker); Butler, 1893: 683.

*Tephritis sabulifera* Warren, 1899: 310. LECTOTYPE ♂, here designated, [Uganda]: Warringo R[iver], Unyoro, 8.VII.[18]97 (Dr Ansorge); *Tephritis sabulifera* Warr. Type ♂; Geometridae genitalia slide No. 9687 (BMNH) [examined].

*Semiothisa uvidaria* Swinhoe, 1904: 509. Holotype ♀; [Kenya]: Tanga, Br[itish] E[ast] Afr[ica], 97.63; *Semiothisa uvidaria* Swinhoe ♀ type; Geometridae genitalia slide No. 9700 (BMNH) [examined].  
Syn. n.

*Tephritis brongusaria* (Walker); Swinhoe, 1904: 512. *Tephritis sabulifera* Warren; Swinhoe, 1904: 583 (synonymy); Janse, 1932: 228 (as synonym of *brongusaria*).

*Tephritis oleochroa* Hampson, 1909: 122. LECTOTYPE ♂, here designated, [Uganda]: SE Ruwenzori, 3,500 f[ee]t, 1.VI.1906, 1906–153; Coll[ected] by [the] Hon[ourable] G. Legge & A.F.R. Wollaston; *Macaria* [sic] *oleochroa* Hampson ♂ type; Genitalia slide Geom[etridae] 1951–205 (BMNH) [examined].

*Macaria brongusaria* (Walker); Hampson, 1910: 468; Janse, 1917: 113.

‡*Macaria brongusaria* ab. *executaria* (Walker); Janse, 1917: 113. Infrasubspecific.

*Tephritis oleochroa* Hampson; Prout, 1932a: 486 (synonymy); Janse, 1932: 228 (as synonym of *brongusaria*).

*Tephritis executaria* Walker; Janse, 1932: 228 (as synonym of *brongusaria*).

*Phasiane miliaria* Felder & Rogenhofer; Janse, 1932: 228 (synonymy).

*Semiothisa brongusaria* (Walker); Janse, 1932: 228; Pinhey, 1975: 86; Fletcher, 1978a: 79.

*Semiothisa brongusaria sabulifera* (Warren); Prout, 1932a: 486.

[*Semiothisa umbrata* (Warren); Taylor, 1953: 156. Misidentification.]

FORE WING LENGTH. 12–16 mm (♂), 12–17 mm (♀).

ADULT (Figs 443–447). Very variable in size and development of markings. Ground colour cream white to ochreous, thickly dusted and/or striated with brown or grey. Basal and median lines moderately well developed to absent, postmedian line clearly angled below costa of fore wing, usually well defined, only in some specimens weak. Postmedian area usually slightly darker. Discal spots faint. Specimens with a prominent, dark round spot near tornus of fore wing are referable to ab. *executaria* (Walker). Underside similar to upperside, but lines poorly defined or absent; postme-

dian area frequently with a darker fascia. Vestiture of thorax and abdomen concolourous with wings. Hind tibia of ♂ not modified. Setal comb on A3 absent.

MALE GENITALIA (Fig. 716). Uncus horns medium-sized; gnathos deeply emarginate. Costa of valve straight, slightly dilated apically and bearing a single, acutely pointed ventral process. Sacculus fairly small, rounded. Aedeagus short and stout; vesica bearing two cornuti, as well as some microcornuti close to apex. Octavals rather inconspicuous and shallow.

FEMALE GENITALIA (Fig. 940). Papillae anales well developed. Apophyses long and slender, a. anteriores not quite two-thirds length of a. posteriores. Sterigma: l. antevaginalis not modified, l. postvaginalis forming small, rounded and rather brain-shaped sclerotizations. Antrum prominent. Bursa copulatrix elongated; ductus bursae long, its posterior portion strongly ribbed, then gradually widening into the elongated corpus. Signum fairly small.

EARLY STAGES (Fig. 4). Egg: length 0.7 mm, width 0.45 mm, pale green, darkening prior to hatching. Shape and sculpture typical for the genus. Larva: First instar: length 1.2 mm, width 0.2 mm. Head: width 0.3 mm, light olive, ocelli black. Body: dorsal and lateral regions: T1–3 greenish-white, A1–2 dark green, A3–10 yellowish-green to yellowish-white. Ventral area dirty brown-green, but yellowish on A9–10. Thoracic legs grey, prolegs yellowish. Second instar: length 4.5 mm, width 0.43 mm. Head: width 0.5 mm, as in L1, but with dark brown maculation on genae. Body: dorsal and lateral areas rather dark green, last abdominal segments yellowish-green. Lateral area slightly paler green. Ventral area blackish-brown over entire length, including legs. Third instar: length 9.5 mm, width 0.85 mm. Head: width 0.8 mm, light green, maculation as in L2. Body: dorsal area dark green, shiny, without any markings. Lateral area also dark green, central portion of segments lighter, particularly on T1–3, but not forming a line. Ventral area to central two-thirds blackish-brown. Thoracic legs blackish, prolegs green on outside, blackish-brown on inside. Fourth instar (Fig. 4): length 19 mm, width 1.8 mm. Head: width 1.8 mm, as in L3, but dark maculation more extensive. Body: dorsal area light green with central line slightly darker, two pairs of dark spots of equal size per segment. Intersegmental areas yellow. Lateral area of same pale green ground colour, central area dirty green with incomplete, undulating dark lines; area around spiracles yellow; unevenly distributed black spots of varying size present. Ventral area darker green, nearly filled by dirty brown lines. Thoracic legs green, marked with black, prolegs nearly pure green. Larva turns purplish prior to pupation. Pupa: dark brown, as described for the tribe.

DIAGNOSIS. Despite its great variability, *Chiasmia brongusaria* is not a difficult species to identify. Exter-

nally, large and pale examples are similar to 152. *C. suriens*, below, and in doubtful cases dissection of the genitalia will be necessary. Also similar is 141. *C. initatrix* (Kenya). The differences in genitalia structure can be seen from the illustrations.

**BIOLOGY.** Considering its wide distribution on the African continent, this appears to be a rather euryoecious species, though *C. brongusaria* clearly prefers open habitats and is absent from the tropical forests of west and central Africa. In southern Africa, adults have been collected throughout the year. The larva has been reared on *Acacia karroo* Hayne (= *A. natalitia* E. Meyer) by myself and others (Taylor, 1949; 1965), and on *A. hirtella* E. Meyer by Mr. E.E. Platt (Platt, 1921), but probably utilizes other species of *Acacia* as well.

**DISTRIBUTION** (Fig. 1028). East Africa (Ethiopia to Tanzania). Widely distributed in southern Africa and absent only from interior of Cape Province and Botswana. Specimens from north-east Namibia (Caprivi) and from Botswana belong to the nominate subspecies as well.

**MATERIAL.** 255♂ (12 dissected, TM genitalia slides No. 539, 960, 961, 10937, 10941, 10960, 10966, 10968, 11044, 11051, 11147; Geometridae genitalia slide No. 16930 (BMNH)) and 273♀ (18 dissected, TM genitalia slides No. 10857, 10942, 10944, 10957, 10961, 10965, 10967, 11045, 11050, 11146, 11148, 11229; slides L 661, L 684, L 687 (NMBZ); slides AcP 9296, 9297 (SANC); slide M. Krüger No. 7 (C. Herbuleot coll.), slide M. Krüger No. 28 (MNHN)). 3 Paris (MNHN), 11 Munich (ZSBS), 370 Pretoria (TM), 4 Pretoria (SANC), 14 Bulawayo (NMBZ), 6 Cape Town (SAM), 89 Nairobi (NMKE), 1 C. Herbuleot collection, 14 N.J. Duke collection, 6 D.M. Kroon collection, 9 H.S. Staude collection.

**LOCALITIES.** **South Africa, Transvaal:** [Gauteng]: Johannesburg, Witkoppen (2), Pretoria (71), Silverton (1), Donkerhoek (1), Suikerbosrand Nature Reserve (4), Magaliesberg (9), Verwoerdburg (2), Boekenhoutskloof (4), Roodeplaat (2), Mooisplaats, Bronkhorstspruit Distr. (7). [North-West]: Rustenburg (29), Hartebeespoortdam, Brits District (1). [Northern Province]: Ofcolaco (18), Lapalala (1), Nylstroom (12), Malati Park (3), Three Sisters (4), Waterval/Pietersburg (1), Wyllie's Poort (3), Farm Kairo 212, NW. Alldays (1), Moordrift (2), Potgietersrus (1), Rooiberg (2), Louis Trichardt (1). Timbadola Forestry, Louis Trichardt Distr. (1), Mountain Inn near L. Trichardt (1), Ohrigstad (1), Mmabolela Estate (1), Nylsvley, Naboomspruit (1), Shiluvane (1); Kruger National Park: Letaba Camp (2), Olifants Camp (1), Nwanedzi (1). [Mpumalanga]: Barberton (6), Fourteen Streams, Barberton District (1), Louws Creek (2), Waterval Onder (2), Waterval Boven (1), Lydenburg, Blouhoogte (1), Kaapmuiden, Komatipoort District (1), Klipfontein (1). Not traced:

Libertas (1). **Free State:** Sasolburg (4), Potchefstroom (1), Bloemfontein (1). **KwaZulu-Natal:** Mboma (1), Hluhluwe (2), Magude (1), Durban (7), Stella Bush (1), Cambridge (1), Sarnia (10), Ladysmith (1), Eshowe (1), Umkomaas (6), Pinetown (1), Muden (13), Dukuduku Forest (3), St. Lucia Bay (10), Mtubatuba (4), Jozini Dam, Lebombo Mts (2), Richard's Bay (4), Pietermaritzburg (1), Tongaat (1), Tugela Mouth (1), Clausthal (1). **Cape Province:** [Western Cape]: Oudtshoorn (4), Beaufort West (2), Saasveld (1). [Eastern Cape]: East London (17), Lake Mentz (1), Humewood (1), Grahamstown (9), Kirkwood (1), Beacon Bay (8), Tsitsikama, De Plaat Forest (1), Port Elizabeth (4), Coerney (1), Coega (1), Addo (1), Hogsback (1), Stutterheim (1), Dunbrody (6), Umtata (11), Langeni Forest (1), Port St. John's (24), Butterworth (2). Ambiguous: S. Cape Province (1), Klipplaat (2). **Swaziland:** Mbabane (2), Mpisi (1). **Namibia:** Mashare (1). **Botswana:** Maun, Crocodile Camp (1), 16 km NE. Maun (1), Tsau, W. Okavango (1). **Zimbabwe:** Wankie (3), Mavuradonha W[ilderness] Are[a] (1), Harare (10), Calgary/Harare (1), Shangani (3), Umvuma (2), Mazoe (1), Lowdale (2), Mutare District (3), Emangeni (1), Chirinda Forest, Mt. Selinda (5), Matsheamhlope/Bulawayo (2), Nyahungwe, Lundi River (1), 17 km S. Chitrapadzi, Limpopo River (1). **Moçambique:** San Martinho (1). **Tanzania:** Lake Ndutu (1), Mt. Meru, Momella, 1600–1800 m (3), Morogoro (1). **Kenya:** Gedi, Sokobe Forest (1), Nakuru (41), Ngong/Nairobi (1), Nairobi (2), Athi River (2), Mutha (1), Kima, 50 m E. Nairobi (1), Fourteen Hills, Thika (1), Namanga Hills, 4500 ft (3), Isiolo, Archers Post (1), Shimba Hills (2), Baringo (1). **Uganda:** Kagera River, Nsongezi (2), Abera Forest, Gulu (1), Jinja, Mabira Forest (1). **Ethiopia:** Dire Doua (1), SW., Omo River, Bongozi (19), Prov. Wallega, Jubdo Bir-Bir, 1900 m (1), Billo (Soddou) (1), Abassena (1), Boché (1).

#### 140a. *Chiasmia brongusaria exosciodes* (Prout, 1925) comb. n.

Figs 448, 449; 1028

*Semiothisa brongusaria exosciodes* Prout, 1925: 596.

Holotype ♂, [Namibia]: Grootfontein, SW Protect[orate]/(R.W. Tucker), Jan[uary] 1920; *Macaria* [sic] *brongusaria exosciodes* Prout ♂ type (SAM) [examined].

*Semiothisa brongusaria exosciodes* Prout; Janse, 1932: 229.

**FORE WING LENGTH.** 13–16 mm (both sexes).

**DIAGNOSIS:** Adult (Figs 448, 449). Frequently smaller than nominate *brongusaria*. The moths are darker and more strongly marked, often having a prominent dark

brown fascia in median area of fore wing and the postmedian area more or less wholly dark brown. This dark obfuscation is usually much better developed in females.

DISTRIBUTION (Fig. 1028). North-western Cape Province north of 32°S and most of Namibia.

MATERIAL. 21♂ and 49♀. 1 London (BMNH), 16 Windhoek (SMWN), 52 Pretoria (TM), 1 D.M. Kroon collection.

LOCALITIES. South Africa, Cape Province: [Northern Cape]: Pofadder (2), Soebatsfontein (16), Brakfontein, Richtersveld (1). [Western Cape]: Vanrhynsdorp (10). Namibia: Okahandja (2), Windhoek (2), Grootfontein (5), Bullspoor (1), Valencia Farm, Rehoboth District (2), Elephants River, 20 m NW Blumefeld (3), Ghaub Valley (1), Hardap Dam, Mariental District (4), Farm Abugabis 90 (1), Naukluft Mts (1).

REMARKS. The male holotype of *Semiothisa brongusaria exosciodes* from Grootfontein does not show the characteristics of this subspecies very well. Although the specimen is rather small (fore wing length 12.5 mm) and has extensive dark dusting on both wings, it lacks the brown obfuscation typical of this subspecies.

#### 141. *Chiasmia imitatrix* sp. n.

Figs 450; 941

TYPE MATERIAL. Holotype ♀, [Kenya]: Muséum Paris, Afrique Orien[ale] Angl[aise], env[irons] de Nairobi (V[icom]te de Poncins et C[om]te de Lambertye), 1912; genitalia slide M. Krüger No. 22 (MNHN).

FORE WING LENGTH. 17 mm (♀ holotype).

ADULT ♀ (Fig. 450). Large and broad-winged. Ground colour of wings pale ochreous, slightly darker on fore wing, finely dusted with grey. Postmedian area of fore wing suffused with ochre. All three lines present on fore wing, postmedian angled below costa. On hind wing, basal line absent, median greatly reduced and postmedian not reaching beyond discal spot. Discal spots and preapical spot present but faint. A faint row of small dark spots distal of postmedian line on fore wing. Underside paler, finely dusted with light grey and devoid of markings except for postmedian line which shines through faintly. Vestiture of thorax and abdomen concolorous with wings.

FEMALE GENITALIA (Fig. 941). Very large for the size of the moth. Papillae anales pointed. Apophyses moderately stout, a. anteriores about two-thirds length of a. posteriores. Sterigma: lateral sclerotizations of l.

postvaginalis rounded, surface rather smooth; l. antevaginalis not modified. Antrum massive and well sclerotized. Bursa copulatrix resembling a long, gradually narrowing tube with finely ribbed wall. Signum small, elliptical.

DIAGNOSIS. Similar to large, pale examples of 140. *C. brongusaria* and to females of 151. *C. olindaria*. However, structure of the genitalia indicates its position within the *brongusaria*-group. The massive antrum is characteristic.

BIOLOGY. Presumably a savanna species.

DISTRIBUTION. Kenya.

ETYMOLOGY. From Latin *imitator* (f. *imitatrix*), an imitator; the species strongly resembles *C. brongusaria* and *C. olindaria*.

#### 142. *Chiasmia sudanata* (Warren & Rothschild, 1905) comb. n.

Figs 451; 717, 942

*Peridela sudanata* Warren & Rothschild, 1905: 28. LECTOTYPE ♂, here designated, [Sudan]: Nakheila, R[iver] Atbara, 7.II.1904; Nov[itates] Zool[ogicae] 1905, Pl. IV, Fig. 26; *Peridela sudanata* Warr. ♂ type; Type; Rothschild Bequest B.M. 1939–1; Geometridae genitalia slide No. 1736 (BMNH) [examined]. Paralectotype (1♂). [Sudan]: same data as holotype (BMNH) [examined].

*Peridela sudanata* Warren & Rothschild; Rothschild, 1921: 216.

FORE WING LENGTH. 12 mm (♂), 12–13 mm (♀).

ADULT (Fig. 451). Small; antennae of ♂ with relatively long pectinations. Ground colour of wings cream white, densely dusted with greyish-brown in ♂; in ♀, dusting less heavy, but wings appearing more variegated due to dark brown suffusion, especially in postmedian area. Basal line present on fore wing only; median more like a fascia; postmedian well developed and acutely angled below costa of fore wing. Preapical spot brown, more conspicuous in ♀. Discal spots dark brown, moderately conspicuous. Underside pale ochreous with fine brown dusting; postmedian area usually predominantly brown with blotches of ground colour along termen and near apex of fore wing. Thorax and body ochreous with faint grey dusting. Hind tibia of ♂ not modified. Segment A3 lost in examined slide preparation.

MALE GENITALIA (Fig. 717). Uncus horns very short; gnathos normal. Costa of valve straight and very stout, a single ventral process present. Sacculus small and quite narrow. Aedeagus slender and spindle-shaped. Vesica bearing a very small median cornutus, sur-

rounded by a group of microcornuti. Octavals w-shaped and weakly sclerotized, with broad, rounded tips.

**FEMALE GENITALIA** (Fig. 942). Papillae anales well developed. Apophyses thin and rather short, a. anteriores less than half length of a. posteriores. Sterigma forming two small lateral 'ears', flanking the shell-shaped antrum. Bursa copulatrix elongated, somewhat banana-shaped. Ductus bursae ribbed. Signum of medium size, situated near middle of corpus.

**DIAGNOSIS.** Similar to 140. *C. brongusaria* and related species, but may be identified by its lesser size, bipectinate ♂ antennae and sombre coloration. Distributional data are also of importance, as *C. sudanata* is confined to northern subsaharan Africa.

**BIOLOGY.** Rothschild (1921) describes the habitat of the species as desert, although it is probably not an element of the desert biome proper. Adults have been collected in November and February–March.

**DISTRIBUTION.** Northern subsaharan Africa, with records from Mauritania, Sudan, Chad, Niger, Nigeria, Senegal, Gambia, Cabo Verde and northern Cameroon. Also recorded from Algeria.

**MATERIAL.** 10♂ (1 dissected, MAKB genitalia slide No. 5) and 19♀ (3 dissected, genitalia slides No. G 6886, 6887 (ZSBS); Geometridae genitalia slide No. 16953 (BMNH), 15 London (BMNH), 5 Bonn (MAKB), 5 Munich (ZSBS), 4 C. Herbulot collection.

**LOCALITIES.** **Mauritania:** Boghé (1). **Sudan:** Ed Damer, Hudeiba (2), Khartum (5). **Chad:** Tibesti, Modra, 1300 m (1). **Niger:** Zinder, Damagarim (2). **Nigeria:** S., Kaduna (1), S., Kano (1), Gadau (4). **Cameroon:** N., Waza (5). **SENEGAL:** Sédiou (2), Senegambia, Casamance (1). **Gambia:** no further data (1). **Cabo Verde:** S. Tiago Praia (1). **Algeria:** Tassilo des Ajers, Mare d'Issaouane (2).

#### 144. *Chiasmia senegambiensis* sp. n.

Figs 452; 718, 943

**TYPE MATERIAL.** Holotype ♂, **Senegal:** (Sénégal), Sédiou, 4. Jan[vier] 1917 (H. Castell); Sc1 ex C1 [handwritten]; Rothschild Bequest B.M. 1939–1; Geometridae genitalia slide No. 16954 (BMNH). Paratype (1♀). **Senegal:** *ibidem*, dated January 1917; sc1.2 coinc[ident]; Rothschild Bequest B.M. 1939–1; Geometridae genitalia slide No. 16959 (BMNH).

**FORE WING LENGTH.** 13 mm (both sexes).

**ADULT** (Fig. 452). Barely medium-sized. Termen of hind wing weakly crenulated. Ground colour of wings cream, densely suffused and irrorated with light leather brown; suffusion heavier in postmedian area. Basal and

median lines reduced, postmedian also very faint, angled below costa of fore wing. Preapical spot and discal spots present but not very conspicuous. Underside: basal and median areas buff with dense brown irroration, discal spots clear but otherwise devoid of markings. Postmedian area similar but entirely (♂) or largely (♀) suffused with leather brown. Vestiture of thorax and abdomen concolorous with wings. Hind tibia of ♂ not dilated. Seta comb on A3 absent.

**MALE GENITALIA** (Fig. 718). Uncus horns short; gnathos normal. Costa of valve straight, dilated apically and bearing a single ventral process. Sacculus narrow, barely twice width of costa, rounded. Aedeagus attenuated anteriorly and posteriorly; vesica with a single short median cornutus. A narrow band of denticles running across tip of cornutus. Octavals arcuate, distal margin of tips well sclerotized.

**FEMALE GENITALIA** (Fig. 943). Papillae anales pointed. Apophyses moderately stout, a. anteriores between half and two-thirds length of a. posteriores. Sterigma: l. antevaginalis not modified; sclerotizations of l. postvaginalis rounded, with smooth surface. Antrum shell-shaped. Ductus bursae strongly ribbed, suddenly widening into the large, membranous corpus. Signum slightly elliptical, situated near centre of corpus.

**DIAGNOSIS.** Externally, *Chiasmia senegambiensis* cannot reliably be separated from indistinctly marked examples of *C. sudanata*, above. In the male genitalia, the costa of the valve is becoming narrower towards base in *senegambiensis* and the aedeagus is somewhat stouter, with a longer median cornutus (compare Figs 717, 718). In the ♀ of *senegambiensis*, the bursa copulatrix is larger, with a longer ductus and broader corpus bursae (compare Figs 942, 943).

**BIOLOGY.** Probably associated with (?arid) savanna. Adults are active in January.

**DISTRIBUTION.** Only known from Sédiou region in Senegal.

**ETYMOLOGY.** From neo-Latin *senegambiensis* (-e); the type locality forms part of the old west African region of Senegambia, which encompasses the modern states of Senegal and Gambia.

#### 144. *Chiasmia tristis* sp. n.

Figs 453; 719, 944; 1029

**TYPE MATERIAL.** Holotype ♂, [South Africa, Northern Cape]: Soebatsfontein, 13.–14.11.[19]33 (G. van Son); TM Lep[idoptera] Het[erocera] genitalia slide No. 10956 (TM). Paratypes (2♀). [South Africa, Western Cape]: 1♀, v.Rhyn's Dorp, SWA [ex errore],

Aug[ust] [19]44, Mr Hewitt Coll.; TM Lep. Het. Genitalia slide No. 10959 (TM). **[Namibia]:** (SWA), Abachaus, Sep[tember] [19]44 (G. Hobohm) (TM).

FORE WING LENGTH. 14 mm ( $\delta$ ), 14–15 mm ( $\varphi$ ).

ADULT (Fig. 453). Medium-sized, of sombre appearance. Ground colour of wings whitish, thickly and evenly dusted with olive grey. Basal and median line faint, slightly darker than ground colour; postmedian line clear, double black-and-ochreous in two specimens, faint in the third. Discal spots blackish, moderately well developed. Wings otherwise without markings. Underside similar, perhaps even more uniform; postmedian line weak to absent. Vestiture of thorax and body concolorous with wings, olive grey. Hind tibia of  $\delta$  not modified. Setal comb on A3 absent.

MALE GENITALIA (Fig. 719). Uncus broad, with two pairs of slender horns; gnathos with thin arms and well developed medial element. Costa of valve long and not dilated apically, exhibiting a single, narrow, acutely pointed ventral process and traces of a very short second process. Sacculus rather small, well rounded. Aedeagus stout and somewhat spindle-shaped; vesica bearing two median cornuti and a number of microcornuti. Octavals inconspicuous, w-shaped.

FEMALE GENITALIA (Fig. 944). Papillae anales normal. Apophyses slender, a. anteriores about half length of a. posteriores. Sterigma forming two small, bean-shaped sclerotizations. Antrum prominent, elongated. Bursa copulatrix tubular; ductus bursae long and broad, its posteriormost section well sclerotized, wrinkled. Corpus rounded, scarcely wider than ductus. Signum very small.

DIAGNOSIS. The sombre colour and absence of markings other than the lines are typical. The male genitalia are characterized by the presence of two pairs of uncus horns.

BIOLOGY. *Chiasmia tristis* is confined to the arid south-western part of southern Africa. The three known specimens were collected in August, September, and November.

DISTRIBUTION (Fig. 1029). Namibia and north-western parts of Cape Province in South Africa.

ETYMOLOGY. From Latin *tristis* (-e), sad; on account of the sombre coloration.

#### 145. *Chiasmia castanea* sp. n.

Figs 454–456, 720, 945, 1029

TYPE MATERIAL. Holotype  $\delta$ , [South Africa, Northern Cape]; C[ape] P[rovince], P.K. le Roux Dam, Van der Kloof, 15.–21.XI.1968 (Snyman & Strydom); TM

Lep[idoptera] Het[erocera] genitalia slide No. 10884 (TM). Paratypes (34 $\delta$ , 41 $\varphi$ ). **[South Africa, Northern Cape]:** 2 $\delta$ , 5 $\varphi$ , same data as holotype (TM genitalia slide No. 10929); 1 $\varphi$ , *ibidem*, dated 8.–12.IV.1970 (Vári & Snyman); 1 $\delta$ , 1 $\varphi$ , *ibidem*, 19.–15.X.1970 (Snyman & Jones); 1 $\delta$ , 2 $\varphi$ , *ibidem*, 15.–19.III.1971 (Snyman & Jones); 2 $\delta$ , Vioolsdrif, 6.–10.VIII.1961 (van Son & Vári); 5 $\delta$ , 4 $\varphi$ , *ibidem*, 14.–18.IX.1970 (Potgieter & Snyman); 1 $\delta$ , 1 $\varphi$ , *ibidem*, 6.X.1971 (Snyman & Jones); 1 $\varphi$ , Pella, 9.–12.IX.1970 (Potgieter & Snyman); 3 $\varphi$ , Orania, Hopetown District, 5.–10.I.1970 (Snyman); 1 $\delta$ , Vanderkloof, 12.XII.1990 (H.S. Staude). **[Free State]:** 8 $\delta$ , 13 $\varphi$ . Oranjekrag, H.F. Verwoerd Dam, 7.–14.X.1968 (J.H. Potgieter); 8 $\delta$ , 7 $\varphi$ , *ibidem*, 9.–17.I.1969 (Snyman & Strydom); 1 $\delta$ , 2 $\varphi$ , *ibidem*, 26.–30.X.1970 (Snyman & Jones); 3 $\delta$ , 1 $\varphi$ , Zastron, Farm Lismore, 12–15.XI.1968 (Snyman & Strydom). **[Namibia]:** (SWA), 1 $\varphi$ , Rehoboth, III.1938 (H.W.B. Morley) (TM, H.S. Staude collection).

FORE WING LENGTH. 13–16 mm (both sexes).

ADULT (Figs 454–456). Ground colour of wings pale ochreous, but ranging in coloration from pale ochreous over reddish to dark brown. Basal and median lines usually weak to absent, but median occasionally developed as a fascia. Postmedian line weak in some specimens, but always at least indicated by a very fine, dark line; usually, however, bordered more or less heavily by black in basal half of fore wing and, less strongly, on hind wing. Discal spots ranging from very faint to well developed. Underside: ochreous with dense brown dusting, postmedian area with a darker brown fascia. Thorax and abdomen ochreous to brown, concolorous with wings. Hind tibia of  $\delta$  slightly dilated. Setal comb on A3 absent.

MALE GENITALIA (Fig. 720). Uncus horns fairly small and thin; gnathos slender. Valva arising very low on massive vinculum; costa straight, narrow, with a single, acutely pointed ventral process. Sacculus small, squarish. Aedeagus short and spindle-shaped; vesica with a single club-shaped median cornutus carrying several spiny extensions, and further exhibiting a granulose patch. Octavals faintly sclerotized, very shallow.

FEMALE GENITALIA (Fig. 945). Large. Papillae anales prominent. Both pairs of apophyses slender, a. posteriores about twice length of a. anteriores. Sclerotizations of sterigma small, broadly elliptical, wrinkled. Antrum massive, funnel-shaped. Ductus bursae widest posteriorly, then gradually tapering; corpus irregularly rounded. Signum small.

DIAGNOSIS. Although subject to marked variation in colour and development of markings, this is an easily recognized species. Phenotypically, it somewhat recalls

131. *C. subcurvaria* and 130. *C. observata*, above, but lacks the bold black streaks present on the fore wing of these species.

**BIOLOGY.** *Chiasmia castanea* is associated with Karoo-like habitats as well as with savanna, but seems to be confined to rather dry localities. Adults have been collected in January, March–April and September–November.

**DISTRIBUTION** (Fig. 1029). South Africa (southern parts of Free State, central and western Cape Province); central Namibia.

**ETYMOLOGY.** From Latin *castaneus* (-*a*, -*um*), chestnut brown; in reference to the colour of the moths.

**146. *Chiasmia inconspicua inconspicua* (Warren, 1897) comb. n.**

Figs 457; 721, 946; 1030

*Tephrina inconspicua* Warren, 1897a: 113. Holotype ♂, [South Africa, KwaZulu-Natal]: Weenen, Natal; *Tephrinopsis* [sic] *inconspicua* Warr. ♂ type; Rothschild Bequest B.M. 1939–1 (BMNH) [examined].

*Tephrina inconspicua* Warren; Hampson, 1910: 469; Prout, 1916b: 160; 1935: 10; Janse, 1917: 112.

*Semiothisa inconspicua* (Warren); Janse, 1932: 220.

**FORE WING LENGTH.** 11–13 mm (both sexes).

**ADULT** (Fig. 457). Small. Ground colour of wings cream white, dusted with very pale ochreous. ♂ slightly darker. All lines weak, postmedian relatively best developed, angled below costa of fore wing. Discal spots present, but not conspicuous. Postmedian area slightly darker, usually with a darker ochreous fascia bordering postmedian line; in some specimens additional darker maculation present. Underside similar or even paler, but lines not shining through; discal spots darker and hence more conspicuous, especially on hind wing. Vestiture of thorax and abdomen ochreous, occasionally dusted with grey. Hind tibia of ♂ not modified. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 721). Uncus horns small; gnathos of medium size. Costa of valve relatively short and stout, the single ventral process long and acutely pointed. Sacculus narrow distal margin forming a short, curved process. Aedeagus long and slender; vesica bearing a single elliptical cornutus, surrounded by a group of microcornuti. Octavals deeply excised, with well sclerotized distal margin.

**FEMALE GENITALIA** (Fig. 946). Strongly elongated. Papillae anales of medium size. Apophyses short and slender, a. anteriores about one-third length of a. posteriores. Sterigma with l. postvaginalis forming two sclerotizations on sides of the shell-shaped antrum.

Bursa copulatrix resembling a long, gradually widening tube; ductus bursae with posterior part strongly ribbed. Signum medium-sized, situated near centre of corpus.

**EARLY STAGES.** Although the species has been reared in captivity, no description is available.

**DIAGNOSIS.** Easily recognized on account of its diminutive size and very pale coloration. 148. *C. assimilis*, below, bears some similarity but is nearly always darker and has the ♂ antennae ciliated, not bipectinate as in *C. inconspicua*.

**BIOLOGY.** This is a widely distributed savanna species. In southern Africa, adults have been collected in every month of the year except September and November. The larva feeds on *Acacia nilotica* (L.) Willd. ex Delile.

**DISTRIBUTION** (Fig. 1030). Southern Africa (South Africa: KwaZulu-Natal and Transvaal provinces; Botswana, northern Namibia, Zimbabwe, Moçambique).

**MATERIAL.** 85♂ (3 dissected, TM genitalia slides No. 946, 10982, slide L 657 (NMBZ)) and 52♀ (2 dissected, TM genitalia slides No. 10983, 11091). 1 Munich (ZSBS), 3 Nairobi (NMKE), 82 Pretoria (TM), 5 Pretoria (SANC), 2 Cape Town (SAM), 1 Windhoek (SMWN), 21 Bulawayo (NMBZ), 11 N.J. Duke collection, 11 H.S. Staude collection.

**LOCALITIES.** **South Africa, Transvaal:** [Gauteng]: Pretoria (12), Zoutpan/Pretoria (1), Roodeplaat (3), Mooisplaats, Bronkhorstspruit Distr. (1). [North-West]: Buffelspoort, Magaliesberg (2), Rustenburg (2), Pilanesberg National Park (1). [Northern Province]: Nylsvley/Naboomspruit (6), Mosdene Farm, SE. Naboomspruit (1), Malati Park/Tzaneen (1), Rooiberg (1), Lapalala Wilderness Area (1), Lalapanzi (3), Blyde River Gorge (1), Woodbush Village (1), Blouberg, N. side, Glenfernness (1); Kruger National Park: Satara (2). [Mpumalanga]: Hectorspruit (1), Louws Creek (1), Klipfontein (1), Pretoriuskop (1). Kruger National Park: Lower Sabi (2). **Free State:** Sasolburg (1). **KwaZulu-Natal:** Nkwaleni (3), Pietermaritzburg (1), Jozini Dam (8), Muden (1), Hluhluwe near False Bay (1), Mkuze (5), Ladysmith (3). **Namibia:** Kowares, S. of Kaokoveld (3), Kaoko Otavi, Kaokoveld (1), Oruvandjei, 8 m W. Kaoko Otavi (1), Tsumeb (1), Barotseland (2), Abachaus (18), Oshikango (2), Oshakati (3), Grootfontein (2). **Botswana:** Kabulabula, Chobe River (2), Lobatsi (1), Maun, Crocodile Camp (2), 16 km NE. Maun (3), Thalamakani River/Maun (1), Gaborone (1). **Angola:** W. Angola, Catambela River, Labita Bay (4). **Zimbabwe:** Wankie (3), Van Niekerk Hotel near Gwai Bridge (2), Victoria Falls (1), Harare (1), Matsheamhlope/Bulawayo (7), Nyamandhlovu (1), Buhwa Foothills, Belingwe (4). **Moçambique:** Ruenya River, Shangara (2).

**146a. *Chiasmia inconspicua pertaesae* (Prout, 1932) comb. n.**

not illustrated

*Tephrina inconspicua pertaesae* Prout, 1932a: 479.  
Holotype ♂, [Kenya]: Type; Afrique Orient[ale] Anglaise, Pori: Landjoro (Alluaud & Jeannel), Mars 1912, 900 m, St. 64; *Tephrina inconspicua pertaesae* Prout ♂ type; *Tephrina inconspicua* subsp. *pertaesae* Prout, Mém[oirs] [de la] Soc[iété] Zool[ogique] [de] France 1932: 29, p.479 (P. Viette, Mai 1951) (MNHN) [examined]. Paratypes (1♂, 2♀). [Kenya]: 1♂, Taita Country, Voi, 600 m, 2.–8.iii.1912; 1♀, Taveta, 750 m, 16.–21.iii.1912. [Tanzania]: (Tanganyika Territory) 1♀, Kilimandjaro, River Himo, 1000 m, 22.–23.iii.1912 (not located in MNHN) [not examined].

*Semiothisa inconspicua* (Warren); Fletcher, 1978a: 81.

DIAGNOSIS: Adult. This subspecies is similar in size to nominate *inconspicua*, but rather duller and browner, with a less well defined postmedian line.

DISTRIBUTION. East Africa (Tanzania and Kenya).

MATERIAL. 14♂ and 14♀ (1 dissected, Geometridae genitalia slide No. 10062) (BMNH). 7 London (BMNH), 21 Nairobi (NMKE).

LOCALITIES. **Tanzania:** Lake Rukwa (2), Banagi Hill, Musoma (1), Shinyanga (1), Usa River, 3900 ft (2). **Kenya:** Marigat (3), Kamasia (11), Voi (1), Lake Baringo (2), Kibwezi (3), Suna, S. Kavirondo (2).

**147. *Chiasmia androphoba* sp. n.**

Figs 458; 947

TYPE MATERIAL. Holotype ♀, [Tanzania]: D[eutsch] O[st] Afrika, Morogoro (Reuss S.G.); 589; genitalia slide M. Krüger No. 9 (ZMHB).

FORE WING LENGTH. 12 mm (♀ holotype).

ADULT ♀ (Fig. 458). Barely medium-sized. Apex of fore wings pointed. Ground colour of wings cream-white, suffused with ochreous and with some additional grey-brown dusting. Postmedian area of both wings darker, light brown. All three lines present but faint; basal and median absent on hind wing. Postmedian relatively best developed, angled at about 90° below costa. Discal spots practically absent on fore wing, very small on hind wing, black. Preapical spot faint, brown. Underside whitish-ochre with some light brown irroration. Discal spots and postmedian line shining through. Postmedian area with an irregular dark brown fascia. Vestiture of thorax and abdomen concolorous with wings.

FEMALE GENITALIA (Fig. 947). Papillae anales normal. Apophyses moderately strong and comparatively short; a. anteriores about two-thirds length of a. posteriores. Sterigma: l. antevaginalis crescentic; l. postvaginalis forming two small, rounded 'ears' on sides of ostium. Antrum broadly funnel-shaped. Bursa copulatrix resembling a short, fairly wide tube. Membranous part of ductus ribbed, remainder of bursa wall membranous. Signum well developed, elliptical.

DIAGNOSIS. The species resembles females of 148. *C. assimilis* below. However, it is easily separated by the structure of the genitalia (cf. Figs 947 and 948).

BIOLOGY. Probably a savanna species like the other members of this group.

DISTRIBUTION. Tanzania.

ETYMOLOGY. From Greek ὄντης, ὅ, a male, and φόβος, ὁ, a fear; the species is at present only known from a single female.

**148. *Chiasmia assimilis* (Warren, 1899) comb. n.**

Figs 459–461; 722, 948: 1029

*Tephrinopsis assimilis* Warren, 1899b: 310. LECTOTYPE ♂, here designated, [Uganda]: Naruangu, Unyoro, 15.V.[18]98 (Dr Ansorge); VI.310/*Tephrinopsis assimilis* Warr. ♂ type; Rothschild Bequest B.M.1939–1 (BMNH) [examined]. Paralectotypes (2♂). [Uganda]: 1♂, Unyoro, Janjoki, 5.V.[18]97 (Dr Ansorge); Rothschild Bequest B.M.1939–1; 1♂, Unyoro, Kikwero, 7.V.[18]97 (Dr Ansorge); Rothschild Bequest B.M.1939–1 (BMNH) [examined].

*Semiothisa instructaria* Swinhoe, 1904: 508. Holotype ♀, [Tanzania]: Kilimanjaro, 87.140; *Semiothisa instructaria* Swinhoe ♀ type (BMNH) [examined]. Paratype (1♀). [Kenya]: E[ast] Africa, Teita, 2500–3000 ft., Jan[uary] 1892 (F.J. Jackson), 97.31 (BMNH) [examined].

*Tephrinopsis assimilis* Warren; Swinhoe, 1904: 583. *Semiothisa assimilis* (Warren); Janse, 1932: 219; Prout, 1932a: 492; Fletcher, 1958a: 138.

*Semiothisa instructaria* Swinhoe; Fletcher, 1958a: 138 (synonymy).

FORE WING LENGTH. 11–14 mm (♂), 12–13 mm (♀).

ADULT (Figs 459–461). Rather small, with relatively narrow fore wings. Antennae ciliate, ciliae longer in ♂. Ground colour of wings whitish, with dense dusting ranging in colour from pure ochreous to grey-brown. Basal and median lines faint or absent, postmedian line well developed, acutely angled below costa of fore wing. Discal spots present but usually not conspicuous. Postmedian area in most examples darker,

frequently with a large dark spot near anal angle of hind wing or some other maculation. Underside similar, ochreous with grey-brown striation; postmedian area in most specimens with a brown fascia in proximal half. Thorax and body concolourous with wings, ochreous to ochreous-grey. Hind tibia of ♂ not modified. Setal comb on A3 present.

**MALE GENITALIA** (Fig. 722). Uncus horns fairly delicate; gnathos with slender arms and large medial element. Costa of valve fairly sturdy, slightly dilated apically and bearing a single ventral process near middle. Sacculus between angular and rounded, with well defined inner margin. Aedeagus stout and somewhat spindle-shaped; vesica with one median cornutus and a conspicuous spinose area at tip. Octavals very large, arcuate.

**FEMALE GENITALIA** (Fig. 948). Papillae anales prominent. Apophyses slender; a. anteriores short, about half length of a. posteriores. Sterigma: l. antevaginalis not modified, sclerotizations of l. postvaginalis small. Antrum short and robust, strongly sculptured. Bursa copulatrix elongated; ductus bursae distinctly ribbed, widest posteriorly, then narrowing to a 'waist' and widening again. Corpus bursae pear-shaped. Signum of medium size, with numerous spicula.

**EARLY STAGES.** No description available; the species was reared by N.J. Duke on *Acacia nilotica*, but probably utilizes other species of *Acacia* as well.

**DIAGNOSIS.** Similar to small examples of 39. *Chiasmia sororcula*, but characterized by its usually narrower fore wings; the differences in the genitalia are evident from the illustrations (compare Figs 623, 722 and 848, 948). There is also some similarity to certain specimens of 140. *C. brongusaria*, above, but *C. assimilis* is nearly always smaller than that species.

**BIOLOGY.** *Chiasmia assimilis* is associated with frost-free savanna, but occurs in subtropical lowland forest as well. The larva feeds, probably among others, on *Acacia nilotica* (see above). In southern Africa, adults have been collected throughout the year, but are apparently most abundant late in the season.

**DISTRIBUTION** (Fig. 1029). In southern Africa along the coast between 25° and 33°S, further in Swaziland, the eastern Transvaal and northern Zimbabwe. In East Africa reported from Tanzania, Uganda and Kenya. Zaire; Cameroon.

**MATERIAL.** 31♂ (7 dissected, TM genitalia slides No. 2715, 10858, 10890, 10901–04) and 51♀ (6 dissected, TM genitalia slides No. 10842, 10843, 10891, 10905, 10950; slide L 666 (NMBZ), 4 Berlin (ZMHB), 6 Munich (ZSBS), 1 Tervuren (MRAC), 1 Florence (MZF), 1 Bulawayo (NMBZ), 48 Pretoria (TM), 2 Cape Town (SAM), 12 N.J. Duke collection, 7 H.S. Staude collection.

**LOCALITIES.** **South Africa, Transvaal:** [Mpumalanga]: Lower Sabi (3), Skukuza (1), Crocodile Bridge (1), Kaapmuiden (1). [Northern Province]: Satara (1), Lalapanzi (1), Nwanedzi (1). **KwaZulu-Natal:** Eshowe (1), Mkuze (8), Durban (5), Jozini Dam (5), Nkwaleni (1), Shongweni Dam (1), Umgeni Dam (1), Verulam (2), Pinetown (1), Magude (1), Mtunzini (1), St. Lucia (1), Dukuduku Forest (1), Coastal District, no further data (1). **Cape Province:** [Eastern Cape]: Beacon Bay (5); The Haven (1). **Swaziland:** Sipofaneni (2), Mpisi (8), Mbabane, Malagwane Hill (3). **Moçambique:** San Martinho (1). **Zimbabwe:** Madziwa Mine (1), Dichwe Forest (8), Harare (1), Hot Springs (2). **Tanzania:** (Deutsch Ost Afrika), Daressalam (2), Mpanda, Sibwesa (4), Lindi (2). **[Zaire]:** (Congo), Kafakumba (1). **Cameroon:** Interior, Mt. Sidderi (1). **Somalia:** Afgoi (1).

#### 149. *Chiasmia maculosa* (Warren, 1899) comb. n.

Figs 462, 463; 723, 949

*Gonodela* [sic] *maculosa* Warren, 1899b: 306. **LECTOTYPE** ♂, here designated, **[Uganda]:** Fovira, Unyoro, 12.V.[18]97 (Dr Ansorge); Rothschild Bequest B.M.1939–1; *Gonodela* [sic] *maculosa* Warr. ♂ type; Geometridae genitalia slide No. 2957 (BMNH) [examined]. Paralectotype (1 ♀). **[Uganda]:** same data as lectotype (BMNH) [examined].

*Semiothisa maculosa* (Warren); Swinhoe, 1904: 507; Prout, 1932a: 486; Debauche, 1938: 47; Fletcher, 1963: 23; 1978a: 80.

*Semiothisa tattaria* Swinhoe, 1904: 508. Holotype ♂, **[Kenya]:** (B. E. Africa), Kirbehs, Nov[ember] 6 (C.S. Betton), 1902–99; *Semiothisa tattaria* Swinhoe ♂ type (BMNH) [examined].

*Macaria maculosa* (Warren); Hampson, 1909: 120.

*Semiothisa tattaria* Swinhoe; Prout, 1932a: 486 (synonymy); Debauche, 1938: 47; Fletcher, 1978a: 80 (as synonym of *maculosa*).

**FORE WING LENGTH.** 10–14 mm (♂), 14–15 mm (♀).

**ADULT** (Figs 462, 463). Medium-sized. Ground colour of wings cream white to pale ochreous, striated with light grey and locally suffused with greyish-brown, brown or olive, particularly postmedian area. Basal and median lines weakly to moderately well developed, but ill defined, more like fasciae. Postmedian line usually better developed, but occasionally incomplete. Most, but not all specimens with a brown to olive fascia bordering postmedian. Preapical spot prominent. Discal spots olive, inconspicuous on fore wing; black and more prominent on hind wing. Underside: ochreous with dense, irregular brown to olive irroration; postmedian area usually with a broad fascia that may be absent

from hind wing. Discal spots and lines as on upperside, somewhat paler. Vestiture of thorax and abdomen concolorous with wings. Hind tibia of ♂ not modified. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 723). Uncus horns of medium size; gnathos with elongated, pointed medial element. Costa of valve elongated, somewhat dilated apically and bearing a single ventral process near middle. Sacculus small and inconspicuous. Aedeagus almost wedge-shaped, strongly tapering anteriorly; vesica with a large, spoon-shaped median cornutus and a subapical group of microcornuti. Octavals furcate, broad and rather shallow.

**FEMALE GENITALIA** (Fig. 949). Papillae anales well developed, elliptical. Apophyses fairly strong, a. anteriores about two-thirds length of a. posteriores. Sterigma fairly prominent, extending posteriorly to distal margin of segment. Antrum well developed. Bursa copulatrix pear-shaped with large corpus and fairly short, ribbed ductus. Signum medium-sized, circular.

**DIAGNOSIS.** Although this is a variable species in regard to wing markings, the genitalia permit ready identification. In the male, *C. maculosa* is characterized by the posteriorly strongly tapering aedeagus and the spoon-shaped aedeagus. In the female, the large antrum and strongly pear-shaped bursa copulatrix are diagnostic.

**BIOLOGY.** Probably associated with savanna. Adults have been collected in November, May and July.

**DISTRIBUTION.** The species occurs in East (Sudan, Ethiopia, Uganda to Tanzania) and West Africa (Nigeria, Cameroon).

**MATERIAL.** 31♂ (1 dissected, Geometridae genitalia slide No. 17738) and 10♀ (1 dissected, Geometridae genitalia slide No. 17739). 13 London (BMNH), 6 Berlin (ZMHB), 6 Munich (ZSBS), 16 Nairobi (NMKE).

**LOCALITIES.** **Nigeria:** S., Kaduna (5). **Cameroon:** interior, Mt. Sidderi (1). **Angola:** Quirimbo, 75 km E. Porto Amboim (4). **Tanzania:** Kilimanjaro (1), no further data (1), Madibira (3), Kurasini (1), I[nsel] Ukerewe (1). **Kenya:** Baringo (1), Isiolo (2), Kacheliba W. Suk (2), Kongolia, Suk (1), Aiwea (1), Ahoos (1), N. Kavirondo, Maramas Distr., Ilala, 4500 ft (1), Maringo (2). **Uganda:** Kalinzu Forest (3), Lake Kyoga, Teso District (1), Madi Opei, Acholi (1), Bwamba Toro (1). **Ethiopia:** SW., Bongozi, Omo River (3), no further data (3). **Sudan:** Nimule (1).

#### 150. *Chiasmia ammodes* (Prout, 1922) stat. et comb. n.

Figs 464; 724, 950; 1031

*Macaria maculosa ammodes* Prout, 1922a: 175. Holotype ♂, [Zambia]: (N.E.Rhodesia) (Treneweth); 190.; *Macaria maculosa ammodes* Prout ♂ Type No. 2415; *Macaria maculosa ammodes* Prout ♂ type (TM) [examined].

*Semiothisa maculosa ammodes* (Prout); Janse, 1932: 218.

‡*Semiothisa maculosa ammodes* (Prout); Debauche, 1938: 47. Misspelling.

**FORE WING LENGTH.** 15–16 mm (♂), 15 mm (♀).

**ADULT** (Fig. 464). Rather large; termen of hind wing with a very short tail. Ground colour of wings cream white, densely suffused with bright ochreous and with grey striation. Postmedian area with additional olive suffusion. Basal and median lines weak and more like fasciae, occasionally absent. Postmedian line also not conspicuous, slightly undulating and angled below costa of fore wing. Preapical spot prominent, olive-brown. Discal spots present but faint, brown on fore wing, blackish on hind wing. Underside similar but markings fainter or partly reduced. Hind tibia of ♂ not modified. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 724). Large. Uncus horns prominent; gnathos rather narrow. Costa of valve broad, with some serrations on distal margin below apex, ventral process also prominent, bearing a serration near base. Sacculus fairly small, rounded. Aedeagus irregularly fusiform; vesica bearing a single, large, rod-like cornutus and exhibiting a subapical patch of microcornuti. Octavals arcuate, with truncated tips.

**FEMALE GENITALIA** (Fig. 950). Papillae anales large, rather elongated. Apophyses of medium width, a. anteriores less than half length of posteriores. Sterigma forming two elliptical sclerotizations. Antrum strongly elongated, narrow; bursa copulatrix pear-shaped with a short and ribbed, locally sclerotized ductus, and a large, rounded corpus. Signum rounded, of medium size.

**DIAGNOSIS.** Similar to *Chiasmia maculosa*, above, but smaller and usually paler. The species is characterized by its rather large size, strongly developed uncus horns and serrations above the ventral process in the male genitalia, and the greatly elongated antrum in the female genitalia.

**BIOLOGY.** Adults have been collected in March, June and August.

**DISTRIBUTION** (Fig. 1031). Recorded from the Democratic Republic of Congo, Zaire, Zambia, Malawi, Moçambique, Zimbabwe and Botswana.

**MATERIAL.** 24♂ (2 dissected, TM genitalia slide No. 10963; slide L 665 (NMBZ)) and 12♀ (2 dissected, TM genitalia slide No. 10964; genitalia slide M. Krüger No. 13 (coll. C. Herbolut)). 18 London (BMNH), 1 Mu-

nich (ZSBS), 3 Pretoria (TM), 8 Bulawayo (NMBZ), 1 C. Herbulot collection; 5 N.J. Duke collection.

**LOCALITIES.** **Botswana:** Maun (7), Sepopa, W. Okavango (1). **Zimbabwe:** Songo River, Siabuwa, Binga (2), Victoria Falls (2), Busi Farm, Chippinga (1), Delawae Ranch, Matetsi (1). **[Zambia]:** NE. Rhodesia, Niamadzi River nr. Nawalia, 2000 ft (1), Shangombo (1), Mazabuka (1). **Zaire:** SE. Katanga, 4000 ft (1), (Belg. Congo), Elisabethville (1). **Dem. Rep. of Congo:** env. Kisangani (1). **[Malawi]:** Nyasaland, SW. of Lake Chilwa (3), Shire Valley, Mwanza R., 600 ft (3), NW. Lake Nyasa, Florence Bay to Karonga, 1650 ft (1). **Moçambique:** E. of Mt. Mlanje, 2500 ft (1), E. of Mt. Chiperone, 22–2500 ft (8).

## 21. *Chiasmia olindaria*-group

The eight medium-sized to rather large species treated here are closely related to the preceding group; they mainly differ in the total reduction of the signum in the female genitalia (except in *umbratilis*) and the structure of the aedeagus, as well as of the ventral process of the costa in the male genitalia. These characters at the same time provide the autapomorphies which define the group.

**MALE GENITALIA** (Figs 725–732). Uncus horns small; gnathos mostly well developed. Costa of valve sturdy, straight or hardly curved; ventral process prominently developed and forming a large, blunt tooth in some species. Sacculus mostly rounded, but occasionally square (*C. trizonaria*, *umbratilis*). Aedeagus stout and usually at least somewhat fusiform; dorsoapical portion frequently sclerotized in a typical fashion; vesica with single cornutus and/or microcornuti. Octavals of varying shape, but broadly cleft in most species.

**FEMALE GENITALIA** (Figs 951–955). Papillae anales and apophyses well developed. Antrum large, displaying elaborate, lateral sclerotizations formed by lamella postvaginalis. Bursa copulatrix large and pear-shaped, signum reduced in all species except *C. umbratilis*.

Like the species of the *brongusaria*-group, this group is confined to savanna habitats and reaches its greatest diversity in eastern and southern Africa, although it is represented with endemic species in West Africa as well.

## Key to species

- 1 Moths with unmistakable reticulate wing pattern (Fig. 472). In study area restricted to Palaearctic Africa (Morocco and Algeria) ..... 157. *Chiasmia clathrata azrouensis* (Wehrli), p. 259
- Moths without such a wing pattern (Figs 465–471, 473–475). Afrotropical Africa ..... 2
- 2(1) ♂ with bipectinate antennae (Fig. 473). ♂ genitalia

(Fig. 732) with club-shaped median cornutus and very prominent octavals. ♀ genitalia (Fig. 955) with signum present. KwaZulu-Natal to Kenya, mostly coastal ..... 158. *umbratilis* (Butler), p. 260

- ♂ with ciliate antennae. ♂ genitalia not as above (Figs 725–730); ♀ genitalia, where known (Figs 951–953) lacking signum. Widely distributed in study area, with 156. *trizonaria* being the only species to occur in KwaZulu-Natal ..... 3
- 3(2) Large moths (fw length 15–18 mm) (Figs 465, 466). ♂ genitalia (Figs 725, 726) with protruding, strongly rounded sacculus. ♀ genitalia as in Figs 951, 952 ..... 4
- Fairly small to medium-sized moths (fw length 12–15 mm) (Figs 467–471). ♂ genitalia as in Figs 727–730; ♀ genitalia, where known, as in Fig. 953 ..... 5
- 4(3) Yellowish-ochre moths with little irroration (Fig. 466). ♂ genitalia (Fig. 726) with pincer-like, deeply excised octavals. ♀ genitalia as in Fig. 952. Transvaal and Botswana to Tanzania ..... 152. *suriens* (Strand), p. 256
- Pale ochreous moths with dense brownish irroration (Fig. 465). ♂ genitalia (Fig. 725) with shallow octavals. ♀ genitalia known from a single, damaged specimen only (Fig. 951). Kenya ..... 151. *olindaria* (Swinhoe), p. 255
- 5(3) Small species (fw length 12–14 mm) with west African distribution (Figs 467, 468). ♂ genitalia as in Figs 727, 728; ♀ unknown ..... 6
- Small to medium-sized species (fw length 12–15 mm) with southern and east African distribution (Figs 469–471). ♂ and ♀ genitalia, where known, as in Figs 729, 730 and 953 ..... 7
- 6(5) Greyish-brown moths (Fig. 468). ♂ genitalia (Fig. 728) with prominent, arcuate octavals. Cameroon ..... 154. *sangueresara* sp. n., p. 257
- Ochreous moths with olive suffusion (Fig. 467). ♂ genitalia (Fig. 727) with octavals arched and narrow. Nigeria ..... 153. *danmariae* sp. n., p. 257
- 7(5) Somewhat olivaceous and fairly small moths (Fig. 469). ♂ genitalia (Fig. 729) with ventral process of costa slender and octavals small and rounded. ♀ unknown. Kenya ..... 155. *soror* sp. n., p. 258
- Yellowish to ochreous, medium-sized moths (Figs 470, 471). ♂ genitalia (Fig. 730) with ventral process of costa stout and octavals deeply arched. ♀ genitalia as in Fig. 953. Southern Africa to Uganda ..... 156. *trizonaria* (Hampson), p. 258

## 151. *Chiasmia olindaria* (Swinhoe, 1904) comb. n.

Figs 465; 725, 951

*Tephrina olindaria* Swinhoe, 1904: 513. LECTOTYPE ♂, here designated, [Kenya]: Machakos (R.C.

Crawshay), 19.VI.[18]98, 99–6.; *Tephritis olindaria* Swinhoe ♂ type; Genitalia slide Geom[etridae] 1951–204 (BMNH) [examined]. Paralectotypes (5♂, 1♀). [**Kenya**]: *ibidem*, dated 27.V. (♂), 2.VI. (♂), 19.VI. (2♂, 1♀), Geometridae genitalia slide No. 16675 (♀) and 13.VII. (♂) (BMNH) [examined]. See Remarks.

FORE WING LENGTH. 17 mm (both sexes).

**ADULT** (Fig. 465). Large, with comparatively slender body. Antennae of ♂ with long ciliae. Ground colour of wings cream white, evenly dusted with grey (slightly denser in ♂). All three lines present on fore wing, but basal and median line indistinct; postmedian well developed, angled at about 100° below costa. Preapical spot brown, but inconspicuous. Hind wing with postmedian line only. Discal spots very small. Underside pale ochreous with fine brown striations, markings similar to upperside, but fainter. Thorax and abdomen ochreous, mottled with brown. Hind tibia of ♂ not modified. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 725). Uncus horns very small; gnathos fairly large, well sclerotized. Costa of valve slightly curved, somewhat dilated apically and bearing a large ventral process. Sacculus large, strongly rounded and exhibiting a discrete sclerotization. Aedeagus stout; apical half well sclerotized dorsally. Vesica without true cornuti but a group of microcornuti present. Octavals roof-shaped, distal margin well sclerotized.

**FEMALE GENITALIA** (Fig. 951). Large even for the size of the moth. Papillae anales pointed. Both pairs of apophyses stout, a. anteriores reaching about half length of a. posteriores. Antrum and ostial region very elaborately structured (cf. figure). Bursa copulatrix lost in ♀ paralectotype examined.

**DIAGNOSIS.** Together with 152. *C. suriens* the largest species of the group. *C. olindaria* may be separated from *suriens* and similar, large examples of *C. brongusaria* by its slenderer body, longer ciliae on the antenna of the ♂ and even, grey striation, which is weaker in both *C. brongusaria* and *suriens*.

**BIOLOGY.** Associated with frost-free savanna. Adults of this rare species have been collected in June–July and November–December.

**DISTRIBUTION.** Kenya.

**MATERIAL.** 8♂ (1 dissected, Geometridae genitalia slide No. 16951) and 2♀. 10 London (BMNH).

**LOCALITIES.** **Kenya:** Nairobi (2), Ndarugu (5), Gheni, Ukamba (2), Muani, Ukamba (1).

**REMARKS.** Swinhoe based his description of *Tephritis olindaria* on 5♂ and 1♀ specimen. However, in BMNH 6♂ with fitting label data were found.

## 152. *Chiasmia suriens* (Strand, 1912) comb. n.

Figs 466; 726, 952; 1031

*Allochrosis suriens* Strand, 1912: 70. Holotype ♀, [Tanzania]: (German East Africa), Mkatta or Morogoro, 30.X.1908 (ZMHB) [not located (W. Mey, pers. comm., and possibly lost)] [not examined]. The identity of the species was established from Strand's description.

FORE WING LENGTH. 15 mm (♂), 15–18 mm (♀).

**ADULT** (Fig. 466). Large. Ground colour of wings pale ochreous to ochreous, finely dusted and striated with grey. Basal and median lines absent or at most weakly developed, postmedian line weakly to well developed, but always thin. Discal spots moderately well developed, dark. Postmedian area usually somewhat darker, a large dark spot present close to tornus of fore wing in some specimens. Underside: similar to upperside, but lines even less clearly defined. Postmedian area with a brown fascia bordering postmedian line. Thorax and body ochreous. Hind tibia of ♂ not modified. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 726). Uncus horns small; gnathos well developed. Costa of valve short, straight and bearing a broad ventral process. Sacculus not large, well rounded; inner margin well defined. Aedeagus stout and spindle-shaped; vesica with a single median cornutus. Apical portion of aedeagus sclerotized dorsally and bearing some denticles. Octavals furcate, tips strongly sclerotized, inner margin finely serrate.

**FEMALE GENITALIA** (Fig. 952). Papillae anales prominent, pointed. Apophyses slender, a. anteriores less than half length of a. posteriores. Sterigma forming two roundish sclerotizations near ostium. Antrum massive, stout. Bursa copulatrix massive, pear-shaped. Ductus bursae broad, with a large and well defined sclerotized area; corpus broad, lacking signum.

**DIAGNOSIS.** Together with *C. olindaria* the largest species of the *olindaria*-group, it resembles 140. *C. brongusaria* in markings, but is characterized, apart from its greater size, by the very light ground colour. The genitalia are quite different, those of the male being characterized, inter alia, by shorter uncus horns, different ventral processes on the costa of the valve, and octavals. The female genitalia are instantly recognizable by the massive antrum and absence of a signum.

**BIOLOGY.** In southern Africa, *C. suriens* inhabits mostly lowveld savanna. Adults have been collected from December to May, with most observations dating from March. In East Africa, *C. suriens* may fly earlier, as the holotype was collected in October.

**DISTRIBUTION** (Fig. 1031). Tanzania; in southern Africa the species has been found in Transvaal and

KwaZulu-Natal provinces of South Africa, Swaziland, Botswana and in Zimbabwe. The material listed below constitutes a **new record** for southern Africa.

MATERIAL. 6♂ (2 dissected, TM genitalia slide No. 11150; N.J. Duke genitalia slide No. 3) and 15♀ (4 dissected, TM genitalia slides No. 10943, 11152; slide L 688 (NMBZ); N.J. Duke genitalia slide No. 4). 2 Nairobi (NMKE), 2 Bulawayo (NMBZ), 15 Pretoria (TM), 2 N.J. Duke collection.

LOCALITIES. **South Africa, Transvaal:** [Gauteng]: Magaliesberg/Pretoria (1). [Northern Province]: Nwanedzi (1), Punda Milia (1), Satara (2). [Mpumalanga]: Skukuza (9), Klipfontein (1). **KwaZulu-Natal:** Muden (2). **Botswana:** Gaborone (1). **Swaziland:** Malagwane Hill/Mbabane (1). **Zimbabwe:** Bubye River (1), 96 m SE. Nuanetsi (1).

### 153. *Chiasmia danmariae* sp. n.

Figs 467; 727

TYPE MATERIAL. Holotype ♂, **Nigeria:** Dan Maria, Kogin Kano Game Reserve, Mar[ch] 1974 (H. Politzow) [handwritten label]; genitalia preparation M. Krüger No. 32 (NMKE).

FORE WING LENGTH. 13 mm (♂ holotype).

ADULT ♂ (Fig. 467). Medium-sized. Ground colour of wings whitish, densely suffused with ochre; postmedian areas olivaceous. Basal line faint, developed on fore wing only; median practically absent. Postmedian line better developed, but also very fine; bluntly angled below costa of fore wing. Discal spots and preapical spot present but rather inconspicuous. Underside ochreous with fine grey dusting; postmedian area brownish except for ochreous blotches on apex of fore wing and near anal angle of hind wing. Discal spots present. Vestiture of thorax and abdomen ochreous, mixed with grey scales. Hind tibia of ♂ not modified. Setal comb on A3 absent.

MALE GENITALIA (Fig. 727). Uncus horns small; gnathos well developed. Costa of valve nearly straight and hardly dilated apically; the short ventral process blunt and irregularly serrated. Sacculus rounded. Aedeagus short and stout, apical region heavily sclerotized and extended to form a long tip. Vesica bearing a group of microcornuti. Octavals arcuate, exhibiting tear-shaped, sclerotized thickenings of distal margin.

DIAGNOSIS. Similar to 155. *C. soror* and small, olivaceous specimens of *C. brongusaria*. Reliable identification is only possible by examination of the genitalia, which clearly show this species to be a member of the *olindaria*-group. The male genitalia are characterized

by the short and blunt ventral process on the costa and the distinct tip of the aedeagus.

BIOLOGY. Probably associated with savanna. The unique holotype was collected in March.

DISTRIBUTION. Nigeria.

MATERIAL. Known from the holotype only.

ETYMOLOGY. Named after the type locality.

### 154. *Chiasmia sangueresara* sp. n.

Figs 468; 728

TYPE MATERIAL. Holotype ♂, **Cameroon:** (Cameroun), Sanguéré-Sara, 9°12'N–13°30'E, 280 m, 26/28.IX.[19]76 (Ph. Darge); genitalia slide C. Herbulot No. 5 (C. Herbulot collection).

FORE WING LENGTH. 12 mm (♂ holotype).

ADULT ♂ (Fig. 468). Small and inconspicuous. Ground colour of wings cream, densely dusted with greyish-brown. Postmedian area suffused with greyish-brown, leaving blotches of ground colour near apex and middle of fore wing and near anal angle of hind wing. All three lines present on fore wing; postmedian obliquely angled below costa. Basal line absent on hind wing. Preapical spot present but inconspicuous. Discal spots dark brown. Underside similar but dark irroration less heavy and contrast between dark and pale areas therefore better defined. Vestiture of thorax and abdomen concolorous with wings. Hind tibia of ♂ not dilated. Setal comb on A3 absent.

MALE GENITALIA (Fig. 728). Uncus horns rather small, well sclerotized; gnathos with slender arms and prominent medial element. Valve robust. Costa curved near middle, not dilated apically and bearing prominent ventral process. Sacculus small, less than twice width of costa, its inner margin well defined. Aedeagus large, wedge-shaped; apical portion towards tip well sclerotized. Vesica lacking cornuti. Octavals prominent, with pentagonal contour.

DIAGNOSIS. Together with *Chiasmia danmariae* and *soror*, this is the smallest species of the *olindaria*-group. The wings are paler than in those species, greyish brown rather than greenish. The differences in male genitalia structure are evident from the illustrations (compare Figs 727–729).

BIOLOGY. According to the collector of the holotype, P. Darge, the arboriferous vegetation at the type locality consists to 90% of Mimosoideae, the remainder being made up by some Annonaceae and palms (C. Herbulot *in litt.*).

DISTRIBUTION. Known from a single locality in northern Cameroon only.

ETYMOLOGY. Named after the type locality.

### 155. *Chiasmia soror* sp. n.

Figs 469; 729

TYPE MATERIAL. Holotype ♂, Kenya: Samburu, Nov[ember] 1973 (G. Rilling); genitalia slide M. Krüger No. 26 (NMKE).

FORE WING LENGTH. 14 mm (♂ holotype).

ADULT ♂ (Fig. 469). Barely medium-sized. Ground colour of wings pale ochreous, densely suffused with olivaceous-ochre and finely striated with grey. Postmedian area somewhat darker. Basal and median lines faint or absent; postmedian better developed, angled at ca. 90° below costa. Discal spots present but inconspicuous. Preapical spot dark, but also not prominent. Underside yellowish-ochre with brown striae; postmedian area with broad brown fascia. Markings as on upperside, slightly weaker. Vestiture of thorax and body ochreous, peppered with grey. Hind tibia lost in holotype. Setal comb on A3 absent.

MALE GENITALIA (Fig. 729). Uncus horns short and stout; gnathos well developed. Costa of valve straight and rather stout, somewhat dilated apically and exhibiting a rather large and pointed ventral process. Sacculus small and rounded, with well defined inner margin. Aedeagus stout and fusiform, posterior half sclerotized dorsally. Vesica bearing a short median cornutus and with a group of microcornuti near middle. Octavals small and rounded, not strongly sclerotized.

DIAGNOSIS. Similar to olivaceous specimens of 140. *C. brongusaria*, above, but slightly smaller. In the male genitalia, the best characters for identification are offered by the octavals and structure of the aedeagus (compare Figs 716, 729).

BIOLOGY. The unique holotype was collected in November.

DISTRIBUTION. Kenya.

ETYMOLOGY. From Latin *soror*, sister; on account of the close similarity of the genitalia to *C. brongusaria*.

### 156. *Chiasmia trizonaria* (Hampson, 1909) comb. n.

Figs 470, 471; 730, 953; 1032

*Macaria trizonaria* Hampson, 1909: 120. Holotype ♂, [Uganda]: SE. Ruwenzori, 3,500 ft., v. 1906, 1906–153; Coll[ected] by [the] Hon[ourable] G. Legge & A.F.R. Wollaston; *Macaria trizonaria* Hmpsn. ♂ type; Geometridae genitalia slide No. 9699 (BMNH) [examined].

*Macaria conventa* Prout, 1913: 217. Holotype ♀, [South Africa, Northern Province]: Three Sisters, 15. Feb[ruary] 1911 (A.J.T. Janse); *Semiothisa* [sic] *conventa* Prout, Type No. 2208; *Macaria conventa* Prout ♀ type (TM) [examined]. **Syn. n.**

*Macaria conventa* Prout; Janse, 1917: 113.

*Semiothisa conventa* (Prout); Janse, 1932: 216 (as good species).

*Semiothisa trizouaria* (Hampson); Janse, 1932: 216.

FORE WING LENGTH. 12–15 mm (both sexes).

ADULT (Figs 470, 471). Ground colour of wings cream-white, suffused to a varying extent with ochre and densely striated with grey to grey-brown. Basal line present on fore wing only, faint to prominent; median line mostly well developed, more like a fascia, but occasionally almost obsolete; postmedian line always present, fine, conspicuously angled below costa. Discal spots inconspicuous. Preapical spot trapezoidal to rectangular, dark, varying in its conspicuousness. Postmedian area darker, irregularly suffused with brown to olive brown, in some specimens bearing a row of small dark spots. Underside ochreous with dense grey striation. Lines weak to moderately well developed. Postmedian area with a broad brown fascia. Vestiture of thorax and abdomen ochreous, dusted with grey. Hind tibia of ♂ not modified. Setal comb on A3 absent. *Variation*. Specimens from northern Namibia are markedly smaller and lighter than examples from other parts of the species' range.

MALE GENITALIA (Fig. 730). Uncus horns small, acutely pointed; gnathos normal. Costa of valve quite broad, with a 'hump' near middle, and slightly dilated apically; ventral process apparently fused from two smaller parts, very broad. Aedeagus strongly narrowing towards apex, its posterior portion well sclerotized. Vesica lacking cornuti but with a group of microcornuti in apical half. Octavals characteristic, forming a high, strongly sclerotized arc.

FEMALE GENITALIA (Fig. 953). Papillae anales narrow and pointed. Apophyses slender, a. anteriores about two-thirds length of a. posteriores. Sterigma forming two large, rounded sclerotizations on sides of ostium. Antrum massive; membranous ductus bursae short and immediately widening into the pear-shaped corpus. Signum absent.

EARLY STAGES (Figs 1f, 6g). Egg: length 0.68 mm, width 0.46 mm, of typical *Chiasmia*-shape (Fig. 1f). Sculpture hexagonal but rather faint; colour very pale green. Larva. First instar: length 1.43 mm, width 0.17 mm. Head: width 0.26 mm, light olivaceous green, ocelli darker. Body without markings. Dorsal aspect dirtyish green, sides more whitish-green; venter somewhat darker than dorsum. Second instar: length 4.74 mm, width 0.4 mm. Head: width 0.37 mm; light brown

with dark maculation on genae. Ocelli very dark brown. Body light green, somewhat darker laterally, mixed with some brown and white, but turning yellowish on A4–10. No markings except for an indistinct whitish dorsal line. Ventral side very dark brown, mixed with some green. Thoracic legs brown, abdominal legs concolorous with body. Third instar: length 12 mm, width 0.63 mm. Head: width 0.94 mm, green to greenish-yellow with extensive blackish-brown maculation above ocelli. Body light green, with whitish, complete dorsal and subdorsal lines and broken, brown and light green lateral line present. Bases of setae blackish. Thoracic and abdominal legs mixed brown and green. Fourth instar: length 24 mm, width 1.29 mm. Head: 1.43 mm, green with some rather faint, irregular maculation on genae above ocelli. Body green mixed with yellowish. Dorsal line absent; two prominent, white addorsal lines from T1 to A9, interrupted between segments. Subdorsal line similarly developed, somewhat weaker. Laterally, T1 and A8 with a single, large, dark brown mark around spiracle; T2–A7 with conspicuous dark maculation forming an oblique streak across segment. Venter green, showing some faint, broken white lines; small dark spots forming a rectangle on A2–5. Thoracic legs green, prolegs heavily marked with brown. Pupa: cremaster as in Fig. 6g.

**DIAGNOSIS.** Similar to some examples of 140. *C. brongusaria*, below. For reliable identification dissection of the genitalia may be necessary; in the ♂, the broad, truncated ventral process of the valvae and the highly arched octavals are characteristic.

**BIOLOGY.** In captivity, the larva has been reared on *Acacia karroo* Hayne. The species occurs widely, but rather locally in not too dry savanna throughout southern Africa and eastern Africa, reaching Uganda in the north. Adults have been collected from January to June and in September–December.

**DISTRIBUTION** (Fig. 1032). Southern Africa (Namibia, Botswana, South Africa (Transvaal, KwaZulu-Natal), Swaziland, Zimbabwe), Malawi to East Africa (Uganda, Kenya and Tanzania). A single, doubtful record exists from the Cape Province, South Africa.

**MATERIAL.** 48♂ (6 dissected, TM genitalia slides No. 963, 10856, 10939, 10945, 11047; SMWN genitalia slide W3) and 31♀ (4 dissected, TM genitalia slides No. 10938, 10940; SMWN genitalia slides W2, W4). 26 Pretoria (TM), 4 Bulawayo (NMBZ), 20 Nairobi (NMKE), 2 Berlin (ZMHB), 2 C. Herbulot collection, 18 N.J. Duke collection, 1 D.M. Kroon collection.

**LOCALITIES.** **South Africa, Transvaal:** [Gauteng]: Pretoria (1), Pretoria North (1). [North-West]: Rustenburg (1). [Northern Province]: Warmbad (1), Farm Warmberg (1), Punda Milia (1), Woodbush Vil-

lage (1). [Mpumalanga]: Barberton (2), Marble Hall (1), Skukuza (1), Nelspruit, 'De Hoop' (4). **KwaZulu-Natal:** Mbona (1), Jozini Dam, Lebombo Mts (1), Midlands, 20 km W. Ixopo, 1220 m (1), Maritzburg (1), Verulam (1). **Cape Province:** [Northern Cape]: Nossob (1). **Swaziland:** Malagwane Hill/Mbabane (1), Mpisi (5). **Namibia:** Abachaus (4), Bagani (1), Valencia Farm, Rehoboth District (4), Oshivello (2), Kuringkuru (1), Okahandja (1), O[st?] Okavango (1); Waterberg, tourist camp (2). **Botswana:** Maun (1), 32 km S. Kang (1). **Zimbabwe:** Darwendale (1), Gatooma (2), Salisbury (7), Mazvikadei Dam, Banket Distr. (2), Khami/Bulawayo (1). **Malawi:** Terere Forest Reserve near Nthalire, 5000 ft (1). **Kenya:** Nakuru (13), Maralal (1), Karura Forest/Nairobi (1), Nairobi (2), Voi (2), Mt. Elgon (1).

### [157. *Chiasmia clathrata* (Linnaeus, 1758)]

*Phalaena Geometra clathrata* Linnaeus, 1758: 524.  
*Chiasmia clathrata* (Linnaeus), Forster & Wohlfahrt, 1981: 224.

The nominate subspecies occurs throughout the Palaearctic. In the study area, the species is represented by ssp. *azrouensis*, below.

#### 157 a. *Chiasmia clathrata azrouensis* (Wehrli, 1937) comb. n.

Figs 472; 731, 954

*Semiothisa (Chiasmia) clathrata azrouensis* Wehrli, 1937: 119. Holotype ♀, **Morocco:** Maroc, Harold Powell, Azrou, 1<sup>re</sup> quinzaine de juillet 1924; *azrouensis* Wehrli Sem. *Chiasmia clathrata* ♀ Type; apparemment forme (? ssp.) de *S. clathrata* L., nous en avons avec les dessins encore + réduits en dessus – Espagne, Portugal, Charente – mais toutes avec des lignes au-dessous des ailes postérieures (MAKB) [examined].

*Chiasma* [sic] *clathrata azrouensis* Wehrli; Audeoud & Roch, 1938: 368.

*Semiothisa clathrata azrouensis* (Wehrli); Toulgoët, 1963: 44; Rungs, 1981: 261.

**FORE WING LENGTH.** 13 mm (holotype).

**ADULT ♀** (Fig. 472, holotype). Barely medium-sized. Antennae filiform. Apex of forewings slightly pointed; termen of hind wings crenulated. Ground colour of wings pale yellow, displaying a characteristic reticulate pattern of brown, as illustrated. Cilia distinctly chequered, pale yellow-and-brown. Underside similar but hind wings somewhat paler than on upper side.

Vestiture of body and abdomen brown, speckled with pale yellow. **Variation.** *Chiasmia clathrata* dis-

plays strong individual variation with regard to the ground colour of the wings (chalk white to deep yellow) and the degree of development of the reticulation, which can range from very faint to bold.

**MALE GENITALIA** (Fig. 731, from nominate subspecies). Uncus horns small, arising from dorsal side of uncus. Gnathos with well-sclerotized medial element. Genital capsule broadly rounded, saccus not produced. Valvae with stout, medially curved costa bearing a single, relatively small process and sacculus narrow, not exceeding twice width of costa. Apex of sacculus extended to form a short process. Juxta weakly sclerotized, three-lobed. Aedeagus short and cylindrical, gently tapering anteriorly and posteriorly; apical portion well-sclerotized and bearing a small, tooth-like projection. Vesica bearing a slender, nail-like cornutus in apical half, subtended by a fine, sclerotized ridge below which is situated a group of approximately 12 denticles.

**FEMALE GENITALIA** (Fig. 954, from nominate subspecies). Papillae anales small and pointed. Apophyses delicate, a. anteriores approximately two-thirds length of a. posteriores. A short, well-sclerotized, cylindrical antrum present, capped by a small, pentagonal operculum. Bursa copulatrix with gradual transition between ductus and corpus bursae, tapering anteriorly. Posteriormost portion of ductus bursae well sclerotized, extending for a short distance beyond connection to antrum. Signum large, elliptical.

**DIAGNOSIS.** Easily recognized by its wing pattern.

**BIOLOGY.** In Europe, the species occurs mainly on meadows with the food plant, various species of herbaceous Leguminosae. Adults fly by day in two generations (May–June and August–September). The holotype of ssp. *azrouensis* was collected in July. For a description of the early stages see Forster & Wohlfahrt (1981).

**DISTRIBUTION.** In the study area limited to Morocco and Algeria.

**MATERIAL.** Only the holotype of *Chiasmia clathrata azrouensis* was seen.

### 158. *Chiasmia umbratilis* (Butler, 1875) comb. n.

Figs 473–475; 732, 955; 1033

*Gnophos umbratilis* Butler, 1875: 417. Holotype ♂, [South Africa, KwaZulu-Natal]: 75.64 Natal; *G. umbratilis* Butler Type; Geometridae genitalia slide No. 9692 (BMNH) [examined].

*Semiothisa arhoparia* Swinhoe, 1904: 509. Holotype ♂, [Kenya]: (B[ritish] E[ast] Africa), Tana R[iver], 3800 f[ee]t, 1.I.[18]99 (R. Crawshay) 99–216;

*Semiothisa arhoparia* Swinhoe ♂ type; Geometridae genitalia slide No. 9693 (BMNH) [examined].

‡*Peridela butaria* ab. *spilota* Warren, 1905b: 405. ‘Holotype’ ♀, [Kenya]: Taveta; *Peridela butaria* ab. *spilota* Warr. ♂ type; Rothschild Bequest B.M.1939–1; Geometridae genitalia slide No. 9694 (BMNH) [examined]. Infrasubspecific.

*Peridela berengaria* Fawcett, 1916: 727. Holotype ♂, [Kenya]: (B[ritish] E[ast] Africa), Kedai, 25.1.1913 (W. Feather) 1920–225; *Peridela berengaria* type specimen; Geometridae genitalia slide No. 9695 (BMNH) [examined].

*Peridela novaria* Fawcett, 1916: 727. Holotype ♀, [Kenya]: (B[ritish] E[ast] Africa), Kedai, 12.IV.1912 (W. Feather) 1920–225; *Peridela novaria* Type spec[imen]; Geometridae genitalia slide No. 9696 (BMNH) [examined].

*Tephrina umbratilis* (Butler); Janse, 1917: 112.

*Tephrina arhoparia* (Swinhoe); Prout, 1932a: 481.

*Semiothisa umbratilis* (Butler); Janse, 1932: 219; Fletcher, 1958a: 138.

*Peridela berengaria* Fawcett; Prout, 1932a: 481 (synonymy with *arhoparia*); Fletcher, 1958a: 138 (synonymy with *unbratilis*); 1978a: 82 (as synonym of *arhoparia*).

*Peridela novaria* Fawcett; Prout, 1932a: 481 (synonymy with *arhoparia*); Fletcher, 1958a: 138 (synonymy of *unbratilis*); 1978a: 82 (as synonym of *arhoparia*).

‡*Peridela butaria* ab. *spilota* Warren; Prout, 1932a: 481; Fletcher, 1978a: 82 (synonymy with *arhoparia*).

*Semiothisa arhoparia* Swinhoe; Fletcher, 1958a: 138 (synonymy with *umbratilis*); 1978a: 82 (as good species).

*Peridela spilota* Warren; Fletcher, 1958a: 138 (synonymy with *umbratilis*).

**FORE WING LENGTH.** 15–17 mm (♂), 16–18 mm (♀).

**ADULT** (Figs 473–475). Large, with broad wings. Antennae of ♂ bipectinate, of ♀, simple. Ground colour of wings ochreous, dusted with grey and with more or less intense greyish suffusion; males on average darker. Basal line virtually absent; median line absent or, if present, more like a fascia. Postmedian line faint to reasonably well developed, fine. Discal spots inconspicuous or totally reduced. Postmedian area in some specimens with blackish maculation, particularly near anal angle of hind wing. Underside vividly ochreous yellow, dusted with brown; proximal half of postmedian area taken up by a broad, dark brown fascia. Discal spots more prominent than on upperside; median line present. Body concolorous with wings, ochreous to grey-brown, with small dark maculae on dorsal side. Hind tibia of ♂ not modified. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 732). Uncus horns small; gnathos with narrow arms and well developed medial

element. Costa of valve slightly curved near middle and dilated apically, with long ventral process. Sacculus not very large, squarish. Aedeagus elongated, pointed apically; dorsal area in posterior half well sclerotized. Vesica bearing a somewhat doorhandle-shaped median cornutus. Octavals prominent, arcuate.

**FEMALE GENITALIA** (Fig. 955). Papillae anales well developed. Apophyses posteriores slender; a. anteriores considerably stouter, about half as long. Sterigma (l. postvaginalis) forming two rounded sclerotizations on sides of ostium. Antrum greatly developed, heavily sclerotized. Membranous part of ductus bursae short, ribbed; corpus fairly rounded but pointed anteriorly. Signum large, circular, situated near middle of corpus.

**DIAGNOSIS.** Pale specimens are similar to some large examples of 140. *C. brongusaria*, above; however, males of *C. umbratilis* have bipectinate antennae (ciliate in *brongusaria*). Females may be recognized by the more vivid coloration of the underside of the wings. The differences in the structure of the genitalia are evident from the illustrations (compare Figs 716, 732 and 940, 955).

**BIOLOGY.** *Chiasmia umbratilis* is rarely collected, but was common around Durban in the early 1950's. In South Africa, the species is largely restricted to the subtropical coastal areas of KwaZulu-Natal; adults have been collected from January to May, and again in August–December.

**DISTRIBUTION** (Fig. 1033). Southern Africa (South Africa, Swaziland, Moçambique, Namibia), ranging northwards through Tanzania to Kenya and Ethiopia. Prout (1932a: 481) also gives Uganda and Malawi (Nyasaland), but I have not seen any material from there.

**MATERIAL.** 33♂ (2 dissected, TM genitalia slides No. 955, 10853) and 43♀ (2 dissected, TM genitalia slides No. 10821, 10854). 5 London (BMNH), 8 Berlin (ZMHB), 1 Munich (ZSBS), 49 Pretoria (TM), 1 Bulawayo (NMBZ), 1 Nairobi (NMKE), 10 N.J. Duke collection, 1 H.S. Staude collection.

**LOCALITIES.** **South Africa, Transvaal:** [Northern Province]: Pafuri (1). **KwaZulu-Natal:** Durban (38), Shongweni Dam (1), Port Shepstone (1), Kosi Lake (1), Verulam (2), Dukuduku Forest (1), Monzi (1), St. Lucia (2), Illovo Beach (1), Sarnia (1), Umgeni (1). **Cape Province:** [Eastern Cape]: Beacon Bay (3), Kei Bridge (3), Port St. John's (1), Umtata (1). **Swaziland:** Mpisi (1). **Namibia:** Abachaus (1). **Moçambique:** Maputo (Lourenço Marques) (1). **Tanzania:** Lindi (1), Tendaguru, Lindi Distr. (6). **Kenya:** Voi Forest (1), Kitobo Forest, Taveta (1), Kibwezi (1). **Ethiopia:** Daroli, Arussi Galla (1). **Not traced:** Wemi River, Toru (1), Kiboko River (2).

## 22. *Chiasmia marmorata*-group

This group comprises four medium-sized to rather small whitish or greyish to reddish species whose distribution is limited to eastern and southern Africa. Two autapomorphies derived from the male genitalia define the group: (i) the truncated or concave sacculus and (ii) the presence of a broad ventral process of the costa which may become dilated in a leaf-like fashion.

**MALE GENITALIA** (Figs 733–736). Uncus horns relatively weakly developed; gnathos deeply emarginate. Costa of valve hardly to moderately dilated apically, ventral process in two species modified to form broad lobe. Sacculus variously shaped, but always bearing some discrete sclerotizations. Saccus either truncated (*C. marmorata*, *interrupta*) or concave (*C. semialbida*, *obliquilineata*). Aedeagus very slender; vesica with true cornuti and/or groups of microcornuti. Octavals variable, small to large.

**FEMALE GENITALIA** (Figs 956–959). Papillae anales and apophyses normally developed. Sterigma and antrum well developed. Bursa copulatrix elongated, pyriform to tubular; signum present or absent.

### Key to species

- 1 Pale, whitish moths (Figs 476–480). ♂ genitalia (Figs 733–735) with sacculus not terminating in a short process; ♀ genitalia as in Figs 956–958. Southern Africa to Ethiopia ..... 2
- Darker, greyish to reddish-brown moths (Fig. 481). ♂ genitalia (Fig. 736) with sacculus terminating in a short process; ♀ genitalia as in Fig. 959. Southern Africa ..... 162. *interrupta* (Warren), p. 264
- 2(1) Larger moths (fw length 12–15 mm) (Figs 476–478). ♂ genitalia (Fig. 733) with ventral process of costa extended in a leaf-like fashion; octavals strongly developed, pincer-like. ♀ genitalia (Fig. 956) pyriform, elongated; bursa copulatrix without signum. Southern Africa ..... 159. *marmorata* (Warren), p. 262
- Smaller moths (fw length 11–14 mm) (Figs 479, 480). ♂ genitalia (Figs 734, 735) with ventral process normal or, if dilated, the resulting lobe much smaller; octavals smaller. ♀ genitalia (Figs 957, 958) differently shaped; bursa copulatrix with small or medium-sized signum. East Africa ..... 3
- 3(2) Adults as in Fig. 479. ♂ genitalia (Fig. 734) with ventral process of costa leaf-like. ♀ genitalia (Fig. 957): bursa copulatrix resembling a narrow, elongated tube; signum very small. Somalia, Ethiopia, Kenya ..... 160. *semialbida* (Prout), p. 263
- Adults as in Fig. 480. ♂ genitalia (Fig. 735) with ventral process normal. ♀ genitalia (Fig. 958): bursa copulatrix flask-shaped with narrow ductus bursae; signum medium-sized. Somalia; Rwanda; Uganda to Tanzania ... 161. *obliquilineata* (Warren), p. 263

**159. *Chiasmia marmorata* (Warren, 1897)**  
comb. n.

Figs 476–478, 733, 956; 1034

*Tephrinopsis marmorata* Warren, 1897a: 114.  
LECTOTYPE ♂, here designated, [South Africa, KwaZulu-Natal]: Weenen, Natal, Oct[ober] 1894: *Tephrinopsis marmorata* Warr. ♂ type; Rothschild Bequest B.M. 1939–1 (BMNH) [examined].  
‡*Tephrinopsis marmorata* ab. *pallida* Warren, 1897a: 114. ‘Holotype’ ♂, [South Africa, KwaZulu-Natal]: Weenen, Natal, XI.[18]93; *Tephrinopsis marmorata* ab. *pallida* Warr. ♂ type; Rothschild Bequest B.M. 1939–1 (BMNH) [examined]. Infrasubspecific.

*Tephrina marmorata* (Warren); Swinhoe, 1904: 513; Prout, 1935: 10.

*Discalma marmorata* (Warren); Janse, 1917: 114.

‡*Discalma marmorata* ab. *pallida* (Warren); Janse, 1917: 114.

*Semiothisa marmorata* (Warren); Janse, 1932: 216.

‡*Gonodela* [sic] *casta* Warren. ‘Type’ ♀, [South Africa, KwaZulu-Natal]: M’fongosi, Zulu L[and] (W.E. Jones), Dec[ember] 1911; *Gonodela* [sic] *casta* Warr. Type ♀; Type (SAM) [examined]. Manuscript name.

FORE WING LENGTH. 13–15 mm (♂), 12–15 mm (♀).

ADULT (Figs 476–478). Very pale. Ground colour cream white, with faint to moderate greyish dusting. All three lines present but greatly varying in development; basal and median line usually rather faint, postmedian faint to very prominent, acutely angled below apex of fore wing. Discal spots inconspicuous or absent. Postmedian area, in particular on fore wing, usually with a dark fascia and/or some dark maculation. Underside: cream white to pale ochreous with dark dusting; lines faint or obsolete, discal spots clear, blackish. Postmedian area with a more or less pronounced ochreous-grey fascia. Thorax and abdomen pale ochreous with some grey dusting. Hind tibia of ♂ not modified. Setal comb on A3 absent. Variation: very lightly marked examples, apparently more commonly observed in the arid parts of the species’ range, are referable to ab. *pallida* (Warren). Specimens from northern Transvaal province in South Africa and Zimbabwe tend to be more heavily dusted with grey.

MALE GENITALIA (Fig. 733). Uncus horns curved, medium-sized; gnathos rather delicate. Valve greatly developed and ornamented; costa massive, ventral process developed to form a large, rounded lobe. Sacculus somewhat triangular, with convoluted distal margin. Saccus large and square, its base truncated. Aedeagus elongated and slender, curved and cleft apically; vesica without cornuti but showing an extensive patch of

microcornuti near middle. Octavals pincer-like, well sclerotized.

FEMALE GENITALIA (Fig. 956). Papillae anales large and rounded. Apophyses anteriores stouter than a. posteriores, approximately two-thirds length of former. Sterigma forming large sclerotizations on sides of os-tium. Antrum large, somewhat trapezoidal. Ductus bursae long, heavily sclerotized and strongly ribbed. Corpus bursae fairly small and rounded, membranous. Signum absent.

EARLY STAGES. The species was reared by N.J. Duke, but no description is available.

DIAGNOSIS. Similar to 140. *Chiasmia brongusaria* and related species in size and pattern of markings, but characterized by its whitish coloration. The structure of both male and female genitalia is highly characteristic.

BIOLOGY. *Chiasmia marmorata* is a fairly widespread savanna species but does not occur outside southern Africa. Adults have been collected from January to May and again from August to December, but are most common from November to January.

DISTRIBUTION (Fig. 1034). Generally distributed in southern Africa, but largely absent from Cape Province, Angola.

MATERIAL. 73♂ (7 dissected, TM genitalia slides No. 980, 2712, 10863, 10936, 11036, 11049; slide L 651 (NMBZ)) and 84♀ (4 dissected, TM genitalia slides No. 10864, 10969, 11126; slide L 652 (NMBZ)). 1 Paris (MNHN), 123 Pretoria (TM), 2 Pretoria (SANC), 8 Cape Town (SAM), 5 Windhoek (SMWN), 1 C. Herbule collection, 12 N.J. Duke collection, 5 H.S. Staude collection.

LOCALITIES. **South Africa, Transvaal:** [Gauteng]: Pretoria(7), Pienaarsriver(2). [North-West]: Rustenburg (25), Bloemhof (1), Vryburg (2). [Mpumalanga]: Barberton (2), Waterval (3), Lydenburg District (1), Pongola (1). [Northern Province]: Pietersburg (1), Warmbath(3), Rooiberg(1), Moordrift(2), Nylstroom (3), Soutpansberg, Louis Trichardt (2), Marakehi (1), Branddraai (1), Chuniespoort (2). No further data (1).

**Free State:** Bloemfontein(2). **KwaZulu-Natal:** Muden (8), Umkomas (1), M’fongosi (2), Kloof (1), Albert Falls/Pietermaritzburg(1), Pietermaritzburg(1), Umgeni Dam (1), Estcourt (1), New Hanover (1), Nkwaleni (1), Colenso (2), Mkuze (1), Monzi (1), Ladysmith (1), Port Shepstone (1), Mhlosinga (1). **Cape Province:** [Northern Cape]: Kuruman (2), P.K. LeRoux Dam, Van der Kloof (1). **Namibia:** W. Okavango (1), Karakovisa (1), Andara, Okavango (1), Abachaus (5), Okahandja (3), Mashare (1), Elephants River, 20 m NW. Blumefeld (12), Ghaub Valley (1). **Botswana:** 32 km S. Kang (1), 16 km NE. Maun (1), Mosetse (1), Gemsbok Pan (1), N’Kate, Makarikari (1). **Zimba-**

**bwe:** Bulawayo (1), Khami/Bulawayo (2), Essev Vale (1), Marandellas (4), Harare (Salisbury) (15), Lowdale (1), Christon Bank (1), Mutare (Umtali) (3), Umvuma (1), Shangani (2), Buhwa Foothills, Belingwe (1), Msali Bridge (1). **Angola:** Huilla, 1800 m (1). **Moçambique:** Changalane (1), Ibo (1).

### 160. *Chiasmia semialbida* (Prout, 1915) comb. n.

Figs 479; 734, 957

*Macaria semialbida* Prout, 1915a: 351. Holotype ♀, [Kenya]: B[ritish] E[ast] A[frica], Taveta, 29.XII.1905, K.St. A. Rogers 1906–91; *Macaria semialbida* Prout ♀ type (BMNH) [examined].

*Macaria semialbida* Prout; Prout, 1916b: 159.  
*Semiothisa semialbida* (Prout); Fawcett, 1916: 727;  
Prout, 1932a: 491; Fletcher, 1978a: 81.

FORE WING LENGTH. 11–12 mm (♂), 11 mm (♀).

ADULT (Fig. 479). Small. Ground colour of wings whitish, suffused with greyish-brown; postmedian area markedly darker. Basal line faint, totally absent on hind wing; median line broad, like a fascia; postmedian line well developed, fine, acutely angled below costa of fore wing. Discal spots small. A conspicuous blackish mark present in postmedian area of fore and hind wing; preapical spot moderately conspicuous, brown. Underside similar, paler in some examples. Vestiture of thorax and abdomen greyish. Hind tibia of ♂ dilated. Setal comb on A3 present.

MALE GENITALIA (Fig. 734). Uncus horns short; gnathos normally developed. Costa of valve stout and somewhat dilated apically, ventral process extended to form a rounded lobe. Sacculus of medium size, rounded and with well defined inner margin. Aedeagus cylindrical, tapering anteriorly. Vesica bearing two broad apical cornuti and exhibiting weak serrations near apex. Octavals fairly small, roof-shaped.

FEMALE GENITALIA (Fig. 957). Papillae anales well developed. Apophyses posteriores stout, a. anteriores narrower, about half as long. Sterigma forming two small sclerotizations on sides of the massive, square antrum. Bursa copulatrix resembling a long and narrow tube; signum very small, situated at base of corpus.

DIAGNOSIS. A small and whitish species, resembling *Chiasmia obliquilineata*, below. However, the latter is markedly larger and paler than *C. semialbida*. The differences in genitalia structure are evident from the illustrations (compare Figs 734, 735; 957, 958).

BIOLOGY. Probably associated with fairly arid savanna. Adults have been collected in January, March–June, August–September, and in December.

DISTRIBUTION. Northern parts of East Africa, recorded from Somalia, Ethiopia and Kenya.

MATERIAL. 22♂ (1 dissected, Geometridae genitalia slide No. 16147) (BMNH) and 24♀ (1 dissected, Geometridae genitalia slide No. 16148) (BMNH). 24 London (BMNH), 1 Munich (ZSBS), 3 Florence (MZF), 14 Nairobi (NMKE), 4 C. Herbule collection.

LOCALITIES. **Kenya:** Isiolo (3), Voi (2), Voi Plantations (1), Voi & Ndi (1), Lake Baringo, 3500 ft. (2), Galana R[iver], 2 m E. Tsavo Nat. Pk. (4), Kaurivo, Kitui (3), Mutha (3). **Ethiopia:** Dire Daoua (22); Gardoba-Djira, Garre (1). **Somalia:** Mogadiscio (1), Afgoi (3).

### 161. *Chiasmia obliquilineata* (Warren, 1899) comb. n.

Figs 480; 735, 958

*Gonodela* [sic] *obliquilineata* Warren, 1899b: 307. LECTOTYPE ♂, here designated, [Kenya]: Muani, Uhamba, 11.xi.[18]96 (Dr. Ansorge); vi.307/ *Gonodela obliquilineata* Warr. ♂ type; Rothschild Bequest B.M. 1939–1 (BMNH) [examined]. Paralectotypes (1♂, 2♀). 1♀, [Kenya]: *ibidem*, dated 12.xi.1896 (BMNH) [examined]. Remaining 1♂, 2♀ not traced in BMNH.

*Semiothisa obliquilineata* (Warren); Fawcett, 1916: 727; Prout, 1916b: 159; 1926a: 14.

FORE WING LENGTH. 13 mm (♂), 14 mm (♀).

ADULT (Fig. 480). Medium-sized. Ground colour of wings chalk white, densely striated with greyish-brown; postmedian area only slightly darker. Basal and median lines faint to moderately well developed; postmedian line also not prominent, not angled below costa of fore wing. Discal spots present but not conspicuous. A round, dark brown spot present in postmedian area of both wings, although faint in some specimens. Underside similar, but striations and suffusion in postmedian area pale orange-brown. Thorax and abdomen concolorous with wings, dorsum of abdomen with some darker maculae. Hind tibia of ♂ dilated, carrying hair-pencil. Setal comb on A3 present.

MALE GENITALIA (Fig. 735). Uncus horns small; gnathos normal, deeply emarginate. Costa of valve dilated apically, exhibiting a single, large, curved ventral process. Sacculus large, protruding, with two discrete sclerotizations of different size. Aedeagus long and slender, tapering anteriorly and with a short serration near tip. Vesica bearing a very fine, needle-like median cornutus. Octavals pincer-like.

FEMALE GENITALIA (Fig. 958). Papillae anales of medium size. Apophyses moderately stout, a. anteriores about half length of a. posteriores. Sterigma large, rounded and with wrinkled texture. Antrum short and cylindrical. Bursa copulatrix fairly small, resembling a

long-necked flask. Ductus bursae long and narrow; corpus bursae rounded. Signum barely medium-sized, with numerous short spicula.

**DIAGNOSIS.** Easily separated from *Chiasmia semialbida*, above, by its larger size and paler markings. Also similar is *C. marmorata*, above, but that species has the postmedian line on the fore wing acutely angled below the costa. Structure of male and female genitalia as illustrated (Figs 733–735 and 956–958).

**BIOLOGY.** Apparently associated with savanna of varying aridity. Adults have been collected in October, December and April.

**DISTRIBUTION.** East Africa: Somalia, Rwanda, Uganda, Kenya, and Tanzania.

**MATERIAL.** 23♂ (1 dissected, Geometridae genitalia slide No. 16145) (BMNH) and 23♀ (1 dissected, Geometridae genitalia slide No. 16146) (BMNH). 20 London (BMNH), 1 Berlin (ZMHB), 11 Nairobi (NMKE), 8 Pretoria (TM), 4 Bulawayo (NMBZ), 2 C. Herbulot collection.

**LOCALITIES.** **[Somalia]:** Somaliland, Mandera, 47 m SW. Berbera, 3000 ft. (1). **Uganda:** Madi Opei, Acholi (2), Paraa M. Falls Park (1), White Nile, Gondokoro (1). **Rwanda:** SE., Rusumo (1), Hôtel de l'Akagera (1). **Kenya:** Kibwezi (4), Voi (3), Nairobi (1), Yatta Kitui (1), Kilifi (1), Kedai (1), Gheri, Ukamba (1), Muani (1), Kibauni, Machakos to Neugia (1). **Tanzania:** Lake Nyassa, Mirambo (1), Dodoma (1), Mikumi, Morogoro District, 1750 ft. (1), Banagi Hill, Musoma (1), Ikoma (1), Kongwa (1), Mpwapwa (8), Kongwa (1), 50 m S. Dodoma (7), 50 m N. Iringa (1), Ft. Ikoma (3).

## 162. *Chiasmia interrupta* (Warren, 1897) comb. n.

Figs 481; 736, 959; 1035

*Peridela interrupta* Warren, 1897a: 110. LECTOTYPE ♂, here designated, [South Africa, KwaZulu-Natal]: Weenen, Natal; *Peridela interrupta* Warr. ♂ type; Rothschild Bequest B.M. 1939–1 (BMNH) (dissected, Geometridae genitalia slide No. 19203) [examined]. Paralectotypes (3♂). [South Africa]: same data as holotype, without type label (BMNH) [examined].

*Peridela interrupta* Warren; Janse, 1917: 112.

*Semiothisa interrupta* (Warren); Janse, 1932: 212.

**FORE WING LENGTH.** 12–14 mm (♂), 14–15 mm (♀).

**ADULT** (Fig. 481). Antennae of ♂ shortly bipectinate, hind wing with a moderately pronounced 'tail'. Ground colour of wings whitish, thickly dusted with grey to brownish-grey. Basal line on fore wing and median line on both wings mostly well developed, more like fas-

ciae. Postmedian line clear, slightly undulating, angled below costa of fore wing. Preapical spot distinct. Discal spots fairly well developed, dark. Proximal half of postmedian area filled by a dark grey fascia, distal half usually lighter. A conspicuous, elliptical black mark near anal angle of hind wing and level with cell on fore wing present in postmedian area. Underside whitish, thickly and irregularly dusted with grey; median line and discal spots usually clear. Postmedian area distally with a broad, dark fascia, terminal part lighter. Vestiture of thorax and body ochreous grey. Hind tibia of ♂ not modified. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 736). Uncus broadly triangular, with very small horns; gnathos deeply emarginate, with strongly sclerotized medial element. Valve massive; costa straight, not appreciably dilated apically; the single ventral process large, blunt. Sacculus not very large, somewhat pointed, distal margin extended to form process, with small sclerotization. Aedeagus fairly small, finely cleft apically and tapering anteriorly. Vesica carrying a single apical cornutus with spinose surface, as well as some indistinct microcornuti in apical half. Octavals triangular and very shallow.

**FEMALE GENITALIA** (Fig. 959). Papillae anales short and rounded. Apophyses slender, a. anteriores one-third to one-fourth length of a. posteriores. Sterigma forming nearly circular sclerotization around ostium, open posteriorly. Antrum rather shell-shaped. Bursa copulatrix small for the size of the moth; ductus bursae ribbed posteriorly, corpus rounded, with weakly sclerotized signum.

**EARLY STAGES** (Fig. 6h). Egg: length 0.6 mm, width 0.34 mm, elliptical, with globose surface. Green, darkening prior to hatching of larva. Larva. First instar: length 1.14 mm, width 0.14 mm. Head: width 0.25 mm, light brown, ocelli darker. Body medium green, with lateral areas and bases of setae paler. Second instar: length 4.14 mm, width 0.54 mm. Head: width 0.56 mm, yellowish-green, ocelli very dark brown. Body light green with A9–10 even paler, yellowish-green. Back with two greenish-white dorso-lateral lines. A3–4 and A6 with one, and A2 with 2 blackish lateral maculae. Ventral aspect very dark, blackish-brown interspersed with green. Thoracic and abdominal legs blackish. Third instar: length 12 mm, width 1.1 mm. Head: width 0.9 mm, evenly yellowish-green, but ocelli dark brown and lower part of genal area yellow. Body vividly green; dorsum with 4 broad yellowish-white lines from T1–A10. Sides with 2 narrow white subdorsal lines, interspersed with fine reddish-brown spots. A2 with 2 (subdorsal and subventral) and A3–5 with a single subventral red-brown macula. Thoracic legs black, abdominal legs dirtyish-green with some brown maculation. Fourth instar: length 17 mm, width 1.8 mm. Head: width 1.3 mm, uniform light green with

yellowish genal streak. Body bright green; 2 narrow, white dorsal lines and 4 broad, yellow and somewhat irregular subdorsal lines present. T2–5 with a large, brownish subventral macula; on T2 in addition a much smaller subdorsal macula. Ventral side dark green. Thoracic and abdominal legs concolorous with body. Pupa: as described for tribe. Shape of cremaster as in Fig. 6h.

**DIAGNOSIS.** Although somewhat variable in coloration, this species is characterized by bipectinated antennae in the ♂ and the presence of a blackish, elliptical mark in the postmedian area of both wings.

**BIOLOGY.** *Chiasmia interrupta* is associated with subtropical savanna and forests. Adults have been observed from January to March and from October to December. Larval foodplants include *Acacia swazica* Burtt Davy and *Acacia karroo* Hayne.

**DISTRIBUTION** (Fig. 1035). Restricted to southern Africa, with most records from KwaZulu-Natal, including the former Transkei, and the eastern Transvaal. Further recorded from Swaziland and Zimbabwe.

**MATERIAL.** 64♂ (3 dissected, TM genitalia slides No. 956, 10907, 11052) and 45♀ (2 dissected, TM genitalia slides No. 10908, 11276). 7 Bulawayo (NMBZ), 86 Pretoria (TM), 3 Cape Town (SAM), 12 N.J. Duke collection, 9 H.S. Staude collection.

**LOCALITIES. South Africa, Transvaal:** [Mpumalanga]: Pullen Farm/Nelspruit (5), Barberton (4), Waterval Onder (3). [Northern Province]: Malta/Pietersburg (1). [North-West]: Rustenburg (1). **KwaZulu-Natal:** St. Lucia (6), Dukuduku Forest (2), M'fongosi (1), Richard's Bay (3), Umhlatuzi River (1), Verulam (2), Sarnia (1), Umkomas (1), Stanger (1), Pietermaritzburg (1), Ngoya Forest, Mtunzini District (1), Estcourt (1), Mkuze (2), Maphelana (7), Weenen (1), Muden (8), Coastal District, no further details (1). **Cape Province:** [Eastern Cape]: Kei Cuttings (4), Kei Bridge (2), Butterworth (1), The Haven (2), Umtata (26), Port St. John's (1), Langeni Forest (1). **Swaziland:** Mpisi (4), Ezulwini (1). **Zimbabwe:** Mwawah's Hill (1), Mutare (5), Chirinda Forest, Mount Selinda (1), Lowdale (3), Harare (1), Selukwe (2).

**REMARKS.** The original description of *Peridela interrupta* Warren is based on 3 male syntypes. However, in BMNH four examples with label data fitting the description were found.

#### Species of uncertain group affinity (alphabetical):

##### 163. *Chiasmia abnormata* (Prout, 1917) comb. n.

Figs 482; 737, 960; 1036

*Tephrina abnormata* Prout, 1917b: 71. Holotype ♂,

[South Africa, KwaZulu-Natal]: Durban, Natal (W. Haygarth)/Feb[ruary] 1914; *Tephrina abnormata* Prout ♂ type; Type; *Semiothisa abnormata* Prout, A.J.T. Janse det[erminavit] (SAM) [examined].

*Tephrina abnormata* Prout; Prout, 1925: pl. 17, Fig. 4. *Semiothisa abnormata* (Prout); Janse, 1932: 213.

**FORE WING LENGTH.** 12–14 mm (♂), 12–13 mm (♀).

**ADULT** (Fig. 482). Wings somewhat glossy. Ground colour ochreous, finely striated with darker ochreous and irrorated with grey. Postmedian area slightly darker. Basal and median line absent to moderately well developed, but then not clearly defined, more like fasciae. Postmedian well developed, fine, gently curved below costa of fore wing. Discal spots distinct, blackish. Underside similar, slightly darker, postmedian line fainter, but discal spots clear. Vestiture of thorax and abdomen concolourous with wings. Hind tibia of ♂ not modified. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 737). Uncus horns very short but stout; gnathos with delicate arms. Costa of valve straight, long and conspicuously slender; a single, very short ventral process present near base. Sacculus with distal margin produced to form a conspicuous, pointed process. Aedeagus elongated, with pointed apex; vesica with a very thin, needle-like cornutus and a subapical group of microcornuti. Octavals nearly circular, with evenly concave distal margin.

**FEMALE GENITALIA** (Fig. 960). Papillae anales normal. Both pairs of apophyses thin, a. anteriores very short, about one third length of a. posteriores. Sterigma extensive. Antrum stout, funnel-shaped. Bursa copulatrix strongly elongated, tubular; ductus posteriorly with a small bulla seminalis. Signum small, spicula irregular in size.

**DIAGNOSIS.** Although not conspicuous, there is no similar *Chiasmia* species, except possibly 165. *C. arenosa*, below. However, that species is always more whitish-grey and has the lines very indistinct.

**BIOLOGY.** A rare species, largely confined to subtropical coastal forests. Adults have been collected in January to April and again from July to December. *Chiasmia abnormata* was collected in good numbers around Krantzloof, Natal, in 1916–17.

**DISTRIBUTION** (Fig. 1036). Restricted to southern Africa and mostly found in southern KwaZulu-Natal, including the former territory of Transkei, and adjoining parts of Cape Province. Single records exist from Swaziland and the Mutare District in eastern Zimbabwe.

**MATERIAL.** 33♂ (3 dissected, TM genitalia slides No. 958, 10978, 11258) and 32♀ (1 dissected, TM genitalia slide No. 10979). 51 Pretoria (TM), 1 Cape Town (SAM), 13 N.J. Duke collection.

**LOCALITIES.** **South Africa, KwaZulu-Natal:** Krantzkloof (38), Clairwood (1), Illovo River (1), Durban (1), Kloof/Durban (1), Umgazi River Mouth (2), Karkloof (2). **Cape Province:** [Eastern Cape]: East London (1), Grahamstown (1), Beacon Bay (5), Kubus Forest/Stutterheim (1); 20 m E. Umtata (1), Umtata (2). The Haven (1), Port St. John's (1), Panza (1). **Swaziland:** Malolotja (3). **Zimbabwe:** Umtali (1).

#### 164. *Chiasmia anguifera* (Prout, 1934) comb. n.

Figs 483; 738, 961

*Semiothisa anguifera* Prout, 1934a: 130. Holotype ♂, **Uganda:** Birunga M[oun]t[ain]s, ii.1933 (G.L.R. Hancock); *Semiothisa anguifera* Prt. ♂ type; Pres[ented] by Imp[erial] Inst[itute] [of] Ent[omology] BM 1934–557 (BMNH) [examined]. *Semiothisa anguifera* Prout; Debauche, 1938: 47; Fletcher, 1963: 23.

FORE WING LENGTH. 15 mm (♂), 13 mm (♀).

**ADULT** (Fig. 483). Of medium size. Antennae of ♂ finely serrated, of ♀, filiform. Abdomen of ♀ markedly shorter. Apex of fore wing rather pointed, termen of hind wing crenulated. Wings glossy, cream white with fine grey dusting; postmedian area slightly darker. All three lines prominently developed on fore wing, black; hind wing without markings. Discal spots present on fore wing but inconspicuous. Underside chalk white with intense dark powdering on hind wing and along costa of fore wing; inner part of fore wing as on upperside. Discal spots absent. Vestiture of body ochreous mixed with some grey scales. Hind tibia lost in examined specimens. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 738). Uncus broad, dome-shaped; horns very small. Gnathos relatively large. Costa of valve gently curved and not dilated apically, without ventral process. Sacculus medium-sized, terminating in a small, rounded knob. Aedeagus fairly small, attenuated. Vesica bearing a minute, needle-like cornutus near apex. Octavals weakly sclerotized, somewhat w-shaped.

**FEMALE GENITALIA** (Fig. 961). Papillae anales well developed. Both pairs of apophyses rather short and sturdy, a. anteriores about half length of a. posteriores. Sterigma: l. postvaginalis forming small and inconspicuous sclerotizations above ostium. Antrum small and cylindrical. Bursa copulatrix taking the shape of a wide tube. Signum small, situated just below centre of corpus.

**DIAGNOSIS.** A very distinctive looking species with its three bold transverse lines on the fore wing. Cannot be confused with any other African macaraine.

**BIOLOGY.** *Chiasmia anguifera* is an afromontane species, restricted to a small area along the Uganda-Zairean border, where it occurs at altitudes of 2500–3000 m. Adults have been collected in February–May and October.

**DISTRIBUTION.** Central-East Africa, known from west Uganda (Ruwenzori), adjacent areas of Zaire (Kivu) and Rwanda. A very rare species in collections.

**MATERIAL.** 3♂ (1 dissected, genitalia slide M. Krüger No. 1 (MRAC)) and 3♀ (1 dissected, C. Herbolut genitalia slide No. 1). 1 Tervuren (MRAC), 5 C. Herbolut collection.

**LOCALITIES.** **[Zaire]:** Kivu, Mt. Kahusi, 2800 m (1). **Rwanda:** SW., Nyungwe Forest, Bigugu, 2500 m (2), SW., Wincka, 2700 m (3).

#### 165. *Chiasmia arenosa* (Butler, 1875) comb. n.

Figs 484–486; 739, 962; 1037

*Aspilates arenosa* Butler, 1875: 419. Holotype ♂, **[South Africa, KwaZulu-Natal]:** 75.64 Natal; *A. arenosa* Butler type; *Semiothisa arenosa* in Janse I.214 (BMNH) [examined].

*Rhinodia? sordidata* Warren, 1897a: 111. Holotype ♂, **[South Africa, KwaZulu-Natal]:** Natal (A.J. Spiller); *Rhinodia sordidata* Warr. ♂ type; Rothschild Bequest B.M. 1939–1 (BMNH) [examined].

*Tephrinopsis bitaeniata* Warren, 1914: 489. Holotype ♀, **[South Africa, KwaZulu-Natal]:** M'fongosi, Zulu L[and] (W.E. Jones), Dec[ember] 1911; *Tephrinopsis bitaeniata* Warr. Type ♀; Type = ♀ *Seniothisa arenosa* But., A.J.T. Janse det[erminavit] (SAM) [examined].

*Peridelia arenosa* (Butler); Janse, 1917: 113.

*Discalua bitaeniata* (Warren); Janse, 1917: 114 (as good species).

*Semiothisa arenosa* (Butler); Janse, 1932: 214.

*Rhinodia sordidata* Warren; Janse, 1932: 214 (synonymy).

*Tephrinopsis bitaeniata* Warren; Janse, 1932: 214 (synonymy).

FORE WING LENGTH. 12–16 mm (♂), 12–15 mm (♀).

**ADULT** (Figs 484–486). Antennae of ♂ bipectinate, of ♀, ciliate. Wings sand-coloured, more or less heavily dusted with grey. Basal line absent, median line absent or represented by a faint fascia. Postmedian line present but not clearly defined. Discal spots absent to moderately well developed. A darker grey fascia distal of postmedian on fore wing, in some specimens extending to hind wing. Underside similar, generally darker. Thorax and abdomen concolourous with wings. Hind tibia of ♂ not modified. Setal comb on A3 absent.

MALE GENITALIA (Fig. 739). Uncus horns short; gnathos with prominent medial element. Costa of valve slightly curved, somewhat dilated apically and exhibiting long and recurved ventral process blunt. Sacculus rounded, bearing a small, discrete sclerotization. Aedeagus large, apical half well sclerotized. Vesica bearing a club-shaped median cornutus and about six conspicuous microcornuti near apex. Octavals arcuate, tips well rounded and strongly chitinized.

FEMALE GENITALIA (Fig. 962). Papillae anales large, widely separated. Apophyses posteriores short and slender; a. anteriores stouter, approximately two-thirds length of former. Sterigma forming two small, strongly sculptured sclerotizations on sides of ostium. Antrum and part of membranous portion of ductus conspicuously fluted. Corpus bursae fairly small, elliptical. Signum crescentic, large, situated near centre.

DIAGNOSIS. The sandy coloration and indistinct markings render this species unmistakable. Superficially, *Chiasmia arenosa* resembles the species of the *C. procidata*-group; however, the males of all southern African representatives of that group have ciliate antennae. Some similarity exists to the species of the *C. abnormata*-group, which are, however, more ochreous in coloration and have a better developed postmedian line.

BIOLOGY. The species is associated with subtropical savanna and forest. Adults have been collected in all months except August; the recorded altitudinal range is from sealevel to 1400 m. The larva was reared on *Acacia caffra* (Thunb.) Willd. by N.J. Duke.

DISTRIBUTION (Fig. 1037). Restricted to southern Africa, with most records from the eastern Transvaal and KwaZulu-Natal, including the former Transkei. Very locally also in south-eastern Zimbabwe.

MATERIAL. 42♂ (3 dissected, TM genitalia slides No. 958, 10984, 11088) and 65♀ (1 dissected, TM genitalia slide No. 10985). 2 Nairobi (NMKE), 1 Bulawayo (NMBZ), 91 Pretoria (TM), 2 Cape Town (SAM), 9 N.J. Duke collection, 1 H.S. Staude collection.

LOCALITIES. **South Africa, Transvaal:** [Mpumalanga]: Barberton (16), Waterval Onder (4). [Northern Province]: Louis Trichardt (3), Zoutpansberg, Farm Oldreive's, Outlook Estate, 1415 m (1), Buzzard Mountain Retreat, Soutpansberg (1), Mahuba's Kloof, 1050 m (1), Lemana (1), Tzaneen (1), Three Sisters (1), Malta, Pietersburg (2). **KwaZulu-Natal:** Nkandla Forest (1), Eshowe (1), Balgowan (3), Krantzloof (3), Mbona (1), Richard's Bay (1), Verulam (1), Sarnia (1), Karkloof (1), M'fongosi (1). **Cape Province:** [Eastern Cape]: Beacon Bay (10), East London (4), Cambridge/East London (2), Stutterheim (1), Blaney (1), Umtata (37), Port St. John's (4), Ntusabane/Pt. St. John's (1). **Zimbabwe:** Mt. Selinda (2).

### 166. *Chiasmia getula* (Wallengren, 1872) comb. n.

Figs 487–490; 740, 963; 1036

*Macaria getula* Wallengren, 1872: 58. Type material: not stated, but description apparently based on holotype ♀, [Namibia]: Swakop River area (not located in UZIL or NRS) [not examined].

*Macaria getula* Wallengren; Janse, 1917: 113; 1932: 234.

*Macaria fuscorufa* Prout, 1915a: 353. Holotype ♂, [Malawi]: Mlanje, Nyassaland, 15.3.[19]13; N.Z. XXII p.353/*Macaria fuscorufa* Prout ♂ type; Rothschild Bequest B.M. 1939–1 (BMNH) [examined]. **Syn. n.** Paratypes (2♂, 2♀). [Malawi]: *ibidem*, dated 17.III. (♂), 20.III. (♀), 26.III. (♀) and 02.IV. (♂) (BMNH) [examined].

FORE WING LENGTH. 16–17 mm (♂), 15–17 mm (♀).

ADULT (Figs 487–490). Large, rather variable in coloration. Fore wing emarginate below apex, more strongly so in ♀. Colour ranging from ochreous with dark dusting to chocolate brown with all intermediates; postmedian area frequently darker, particularly in ♀. Basal and median lines as well as discal spots faint to absent in most examples; postmedian line angled below costa of fore wing, ranging from well developed to obsolete. Preapical spot square, brown. Underside equally variable, but generally resembling upperside. Vestiture of thorax and abdomen concolourous with wings, ochreous to chocolate brown. Hind tibia of ♂ not modified. Seta comb on A3 present.

MALE GENITALIA (Fig. 740). Uncus horns long and prominent; gnathos normal. Costa of valve long, nearly straight and bearing a small and blunt ventral process. Sacculus with sinuous termen. Aedeagus short and stout, somewhat spindle-shaped; vesica with a single median cornutus and a subapical group of microcornuti. Octavals inconspicuous, with strongly sclerotized distal margin.

FEMALE GENITALIA (Fig. 963). Large and strongly elongated. Papillae anales small. Apophyses slender; a. anteriores two-thirds length of a. posteriores. Sterigma forming two very small sclerotizations near ostium. Antrum large, appearing swollen. Bursa copulatrix resembling a wide tube; ductus bursae ribbed posteriorly, corpus membranous. Signum very large, crescentic and situated near centre of corpus.

EARLY STAGES. No description available, but see under Biology.

DIAGNOSIS. A characteristic, large, ochreous-brown species. *Chiasmia getula* is not unlike 113. *C. majestica*, above, but is brown rather than ochreous and lacks the 'tail' on the hind wing.

BIOLOGY. The few adults known were collected from

September to December (southern Africa) and April (Tanzania). The species was recently bred by N.J. Duke on *Newtonia buchananii* G. & B. (Mimosoideae). In the Honde Valley in south-eastern Zimbabwe ( $18^{\circ}30'S$   $32^{\circ}50'E$ ), the species occurs in a habitat consisting of subtropical forest mixed with savanna elements (N.J. Duke, *pers. comm.*).

**DISTRIBUTION** (Fig. 1036). Southern and eastern Africa, recorded from Namibia, Zimbabwe and Malawi; and Tanzania, Kenya and Uganda, respectively.

**MATERIAL.** 19♂ (2 dissected, Geometridae genitalia slide No. 16952 (BMNH); slide L 648 (NMBZ)) and 34♀ (2 dissected, TM genitalia slide No. 11046, slide L 649 (NMBZ)), 15 London (BMNH), 1 Berlin (ZMHB), 9 Pretoria (TM), 8 Bulawayo (NMBZ), 4 Nairobi (NMKE), 15 N.J. Duke collection, 1 H.S. Staude collection.

**LOCALITIES.** **Zimbabwe:** Vumba Mts. (5), Aberfoyle, Honde Valley (23), Mt. Selinda, Melsetter (1). **Malawi:** Mt. Mlanje, Lujeri Tea Estates (3), Zomba plateau (1), Nyassaland, Mt. Mlanje (7), Mlanji Boma, 2400 ft. (2), Mlanje, Luchena R. (2), Nantembo/Zomba (1). **Tanzania:** Amani, E. Usambara Mts. (3), Ukami Mts., 1200 m (1). **Kenya:** Nairobi (3). **Uganda:** Entebbe (1).

**REMARKS.** The type locality is given by Wallengren as 'E territorio fluminis Swakop (Wahlberg)'. Janse (1932: 234), who lists *getula* under *species auctorum*, remarks that '... a female is recorded by Wllgrn. from Zwartkop (S.W. Protectorate)'. It is assumed here that Zwartkop is an incorrect subsequent spelling.

### 167. *Chiasmia gyliura* (Prout, 1932) comb. n.

Figs 491–494; 741, 964

*Semiothisa gyliura* Prout, 1932a: 494. Holotype ♀, [Uganda]: Type; Muséum Paris, Rouwenzori, Forêts, 2200 [m], Ch. Alluaud 1909; *Semiothisa gyliura* Prout ♀type; *Semiothisa gyliura* Prout, Mém. Soc. Zool. France 1932, 26, p. 494 (P. Viette Mai 1951); genitalia slide M. Krüger No. 2 (MNHN) [examined].

**FORE WING LENGTH.** 14–15 mm (♂), 17 mm (♀).

**ADULT** (Figs 491–494). Medium-sized. Termen of fore wing strongly emarginate below apex; hind wing with a well developed tail. Ground colour of wings whitish, densely irrorated with ochre and speckled with grey. All three lines present but faint except for postmedian which is angled at  $90^{\circ}$  below costa of fore wing. Discal spots present but inconspicuous. Preapical spot prominent, dark brown. Some whitish maculation present along termen of hind wing. Underside beauti-

fully suffused with orange-brown and speckled with white. Markings appearing faint. Thorax and abdomen concolorous with wings, ochreous on upper- and orange-brown on underside. Hind tibia of ♂ dilated. Setal comb on A3 absent.

**MALE GENITALIA** (Fig. 741). Uncus horns and gnathos medium-sized. Costa of valve straight and somewhat attenuated, not dilated apically and with a long and pointed ventral process arising near base. Sacculus about twice width of costa, termen extended to form a short, curved process. Aedeagus short and fusiform; vesica bearing two needle-like cornuti. Octavals broadly arcuate, with well rounded tips.

**FEMALE GENITALIA** (Fig. 964). Papillae anales pointed. Apophyses anteriores markedly stouter than a. posteriores, reaching approximately half length of former. Sterigma prominent, somewhat crescentic and extending posteriorly to distal margin of segment. Antrum well developed. Corpus bursae large and pear-shaped; ductus strongly ribbed. Signum large, slightly elliptical.

**DIAGNOSIS.** Similar to 105. *Chiasmia curvilineata*, above, in size and markings, but characterized by the strongly emarginate apex of the fore wing and the pronounced tail on the hind wing. *Chiasmia gyliura* resembles most of the yellowish species in the *trirecurva*-group, but has very different ♂ and ♀ genitalia.

**BIOLOGY.** The species is associated with afromontane rainforest at altitudes from 2000–2500 m.

**DISTRIBUTION.** East Africa, Ruwenzori Range and adjoining mountains in Rwanda; Tanzania.

**MATERIAL.** 8♂ (2 dissected, genitalia slides M. Krüger No. 12, 13) (NMKE) and 2♀. 4 London (BMNH), 4 Nairobi (NMKE), 2 C. Herbulot collection.

**LOCALITIES.** **Uganda:** Kalinzu Forest, Ankole (2), Mafuga Rain Forest, Kigezi, 7500–8000 ft. (1), Ruwenzori, Mahoma River, 6700 ft. (1), Namwamba Valley, 6500 ft. (1), Bwamba Pass, W. side, 55–7500 ft. (1), Busongoro (1). **Rwanda:** SW., Nyungwe Forest, 2000 m (1), *ibidem*, Delvaux road at km 21, 2000 m (1). **[Tanzania]:** (T[anganyika] T[erritory]), Mufindi (1) (NMKE).

### 168. *Chiasmia nana* (Warren, 1898) comb. n.

Figs 495; 742, 965; 1037

*Evarzia nana* Warren, 1898b: 250. Holotype ♀, [Nigeria]: Warri, IV.[18]97 (Dr Roth); V.250/*Evarzia nana* Warr. ♀type (BMNH) [examined].

*Evarzia nana* Warren; Swinhoe, 1904: 583.

*Macaria atriclathrata* Hampson, 1909: 121. Holotype ♂, [Uganda]: Ruwenzori, 000 ft. [sic], 22.I.[19]06, 1906–153; *Macaria atriclathrata* Hmps. ♂ type (BMNH) [examined].

*Semiothisa atriclathrata* (Hampson); Debauche, 1938: 46.

*Semiothisa nana* (Warren); Fletcher, 1963: 23.

*Macaria atriclathrata* Hampson; Fletcher, 1963: 23 (synonymy).

FORE WING LENGTH. 12–13 mm (♂), 11–14 mm (♀).

ADULT (Fig. 495). Small. Apex of fore wing falcate, termen of hind wing with a moderately well to well developed tail. Colour variable; ground colour of wings cream white, densely suffused with pale ochreous to light brown; postmedian area more heavily so. Basal and median line rather faint and indistinct; postmedian line better developed. Discal spots weak on fore wing, larger on hind wing. Apex of fore wing occupied by a cream white blotch. Interneurals prominent on both wings, blackish, intersected by ochreous veins. In some specimens interneurals reduced, but always discernible on hind wing. Underside: basal and median area whitish with moderate to dense, irregular brown striation; discal spots and lines as on upperside. Postmedian area wholly orange brown to brown, lighter towards termen; apex of fore wing with a whitish blotch. Vestiture of thorax and abdomen ochreous grey, intersegmental areas of abdomen lighter. Hind tibia of ♂ dilated, carrying hair-pencil. Seta comb on A3 absent.

MALE GENITALIA (Fig. 742). Uncus horns long and prominent; gnathos deeply emarginate. Costa of valve straight, not dilated apically and bearing a long, curved ventral process. Sacculus angular, approximately twice width of costa, outer margin rather finely serrated. Aedeagus stout, deeply cleft apically, with coarse serrations; vesica bearing a rather small median cornutus, as well as several microcornuti. Octavals roof-shaped, narrow and well sclerotized.

FEMALE GENITALIA (Fig. 965). Papillae anales long and narrow. Apophyses posteriores long and thin, a. anteriores stouter, between one-third and half length of former. Operculum large, semicircular. Antrum short and massive. Bursa copulatrix tubular, corpus bursae not much wider than ductus, the latter heavily sclerotized posteriorly. Signum well developed, circular.

DIAGNOSIS. Similar to 49. *Chiasmia natalensis*, above, but characterized by a less falcate fore wing apex and the prominent dark interneuronal patches.

BIOLOGY. The species is associated with tropical forest. It occurs at low elevations in West Africa, but is more mountainous in the southern and eastern part of its range. Adults have been collected in southern Africa in November and from March–May. The occurrence of

darker specimens during periods of drought is discussed in the section on biology.

DISTRIBUTION (Fig. 1037). Widely distributed in the Afrotropical region. In southern Africa recorded locally from the escarpment in Zimbabwe and adjoining parts of Moçambique. The Zimbabwean specimens listed below constitute a new record for southern Africa.

MATERIAL. 57♂ (1 dissected, slide L 659 (NMBZ)) and 44♀ (1 dissected, TM genitalia slide No. 11108), 20 London (BMNH), 5 Berlin (ZMHB), 2 Munich (ZSBS), 22 Nairobi (NMKE), 15 Pretoria (TM), 15 Bulawayo (NMBZ), 11 C. Herbule collection, 11 N.J. Duke collection.

LOCALITIES. **Zimbabwe:** Vumba Mts. (18), Aberfoyle, Honde Valley (17). **Zambia:** Mbala, Abercorn (3). **Moçambique:** Mt. Gorongoza (1), Quicolungo, 120 km N. Lucala, 800 m (1). **Uganda:** Kayonza, Kigezi (1), Fort Portal (1), Ruwenzori, 6000 ft. (1), W., Bwamba (3), Mpanga Forest/Fort Portal (2), Kalinzu Forest, Ankole (3), Mabira Forest, Jinja (5). **Kenya:** Kakamega (2). **Liberia:** Limba, Grassfield (2). **Zaire:** Bena Dibele, Sankuru Kasai (1), Elisabethville (2). **Republic of Congo:** env. Ouesso (7). **[Cameroon:** Tibati, 2000 ft. or **Nigeria:** Ado-Ekiti, 800 ft.]. **Nigeria:** Ibadan (2). **Cameroon:** Johann-Albrechts-Höhe (7), S., Epulan (1), Bitje (1), Namiong b[e]i Lolodorf a[m] Lokundjefluß (1). **Togo:** Misahöhe (2). **Ivory Coast:** Bingerville (7), Yapo Sud, 22 km SSE. Agboville (4). **Ghana:** Kumasi (1).

### 169. *Chiasmia normata* (Walker, 1861) comb. n.

Figs 496; 743, 966; 1038

*Tephrina normata* Walker, 1861: 966. Holotype ♀, **[Australia]:** Moreton Bay/59.105; this must be Walker's type of *normata*, p.966 L[ouis] B[eethoven] P[rout]; specimen photographed for Checklist [of] Aust[ralian] Lep[idoptera] Film 6818 (BMNH) [examined].

*Aspilates parallelaria* Walker, 1863 (1862): 1680. Holotype ♀, **[Sri Lanka]:** Ceylon/52.62; *Aspilates parallelaria* (BMNH) [examined].

*Aspilates? exfusaria* Walker, [1863]: 1683. Holotype ♂, **[Australia]:** Moreton Bay, 57.130; *Aspilates exfusaria*; Genitalia slide Geom[etridae] 1951–206; specimen photographed for Checklist [of] Aust[ralian] Lep[idoptera] Film 6819 (BMNH) [examined].

*Tephrina desiccata* Walker, 1866: 1660. Holotype ♂, **[Indonesia]:** [Java], 60–15 E.I.C.; 595; *Tephrina desiccata*; Genitalia slide Geom[etridae] 1951–207 (BMNH) [examined].

*Epione malefidaria* Mabille, 1880: 23. Lectotype ♂, **[Sine patria]:** type; *Apicia malefidaria* Mab.; Ex

- musaeo* P. Mabille 1923; Ex Oberthür Coll. Brit. Mus. 1927.-3; *Epione malefidaria* Mabille Lectotype ♂ sel. D.S. Fletcher 1966 (BMNH) [examined]. Listed as a synonym by Herbuleot, 1956: 248 and formally synonymized by Fletcher, 1958b: 130.
- Discalma normata* (Walker); Meyrick, 1892: 590; Janse, 1917: 114; Debauche, 1938: 46; Herbuleot, 1954b: 324; 1956: 248; Paulian & Viette, 1955: 200.
- Tephritis parallelaria* (Walker); Hampson, 1895: 210 (synonymy); Swinhoe, 1904: 512; Janse, 1932: 212 (as synonym of *normata*).
- Tephritis congener* Warren, 1897: 113. Holotype ♂, [Philippines]: N[orth] Luzon, 5–6000 ft. (Whitehead); *Tephritis congener* Warr. Type ♂; Rothschild Bequest B.M. 1939–1 (BMNH) [examined].
- Tephritis minoa* Strand, 1915: 179. Holotype ♂, [Cameroon]: Bonaberi (Kamerun), XI.–XII. 1910, Hintz coll. et ded.; *Tephritis minoa* m[ea] ♂ Strand det.; Holotypus (DEI) [examined]. Paratype (1 ♂). [Cameroon]: same data as holotype (DEI) [examined].
- Aspilates? exfusaria* Walker; Janse, 1932: 212 (synonymy); Herbuleot, 1954b: 324; Fletcher, 1958a: 136; 1958b: 130 (as synonym of *normata*).
- Tephritis desiccata* Walker; Janse, 1932: 212 (synonymy); Herbuleot, 1954b: 324; Fletcher, 1958a: 136; 1958b: 130 (as synonym of *normata*).
- Tephritis congener* Warren; Janse, 1932: 212 (synonymy); Herbuleot, 1954b: 324; Fletcher, 1958a: 136; 1958b: 130 (as synonym of *normata*).
- Tephritis minoa* Strand; Janse, 1932: 212 (synonymy); Herbuleot, 1954b: 324; Fletcher, 1958a: 136; 1958b: 130 (as synonym of *normata*).
- Semiothisa normata* (Walker); Janse, 1932: 212; Fletcher, 1958a: 136; 1958b: 130; 1963: 23; 1978a: 78; Herbuleot, 1978: 161; 1981: 223.
- Aspilates parallelaria* Walker; Herbuleot, 1954b: 324 (synonymy); Fletcher, 1958a: 136; 1958b: 130 (as synonym of *normata*).
- Epione malefidaria* Mabille; Herbuleot, 1954b: 324 (synonymy); 1956: 248; Fletcher, 1958a: 136; 1958b: 130 (as synonym of *normata*).

FORE WING LENGTH. 11–13 mm (both sexes).

ADULT (Fig. 496). Medium-sized, termen of hind wing well rounded, without the trace of a 'tail'. Ground colour of wings ochreous to greyish-ochreous with darker dusting; postmedian area darker in most specimens, rarely with a series of darker spots present. Basal line faint and acutely angled on fore wing, absent on hind wing; median line absent to moderately well developed, indistinct; postmedian line well developed on both wings, straight. Discal spots usually absent, but occasionally present, faint. Underside vividly yellowish-ochre with intense brown striation. Lines fainter, discal spots clearer than on upperside; postme-

dian area proximally with a darker brown fascia. Vestiture of thorax and abdomen ochreous. Hind tibia of ♂ not modified. Setal comb on A3 present.

MALE GENITALIA (Fig. 743). Uncus horns prominent, curved; gnathos fairly delicate. Costa of valve curved, not dilated apically. The single ventral process large and exhibiting a sclerotized ridge along ventral margin. Sacculus small, somewhat pointed. Aedeagus stout and fusiform; vesica with a very small apical cornutus surrounded by a group of microcornuti. Octavals conspicuous, deeply excised and sclerotized.

FEMALE GENITALIA (Fig. 966). Papillae anales small. Both pairs of apophyses short and slender, a. anteriores between half and one-third length of a. posteriores. Sterigma with wrinkled texture, as in figure. Antrum short and massive. Bursa copulatrix strongly elongated, ductus ribbed posteriorly. Signum medium-sized, situated near base of corpus bursae.

DIAGNOSIS. Separated from all similar species by the straight postmedian line on both wings. The species bears some resemblance to *Plateoplia acrobelia* (*Platypepla* group of genera) which, however, is much smaller and paler yellowish in coloration.

BIOLOGY. *Chiasmia normata* is fairly generally distributed but seems to prefer subtropical forest areas. In southern Africa, adults have been collected throughout the year. The wide distribution in general, and the occurrence of single specimens far to the west of its main distribution (see Fig. 1038), suggest some migratory capacity of this species.

DISTRIBUTION (Fig. 1038). Given by Fletcher (1978a) as Africa south of the Sahara, Madagascar, India to Australia. In southern Africa the centre of distribution lies in KwaZulu-Natal (including the former Transkei) and the Transvaal. It remains unclear whether the single specimens collected in Botswana and Zimbabwe were migrants or whether the species is resident in these areas.

MATERIAL. 127 ♂ (4 dissected, TM genitalia slides No. 983a, 10980; slide L 650 (NMBZ); slide AcP 9294 (SANC)) and 100 ♀ (2 dissected, TM genitalia slides No. 983, 10981). 16 Paris (MNHN), 6 Berlin (ZMHB), 6 Munich (ZSBS), 128 Pretoria (TM), 3 Pretoria (SANC), 5 Cape Town (SAM), 48 Bulawayo (NMBZ), 12 N.J. Duke collection, 2 H.S. Staude collection.

LOCALITIES. South Africa, Transvaal: [Gauteng]: Johannesburg (1), Pretoria (2). [Mpumalanga]: Erasmus Reserve, Pilgrim's Rest District (3), Sabie (2), White River (1), Nelspruit (1), Bushman Rock (1). [Northern Province]: Nylsvley (3), Three Sisters (2). KwaZulu-Natal: Nshongweni (1), Kloof (2), Karkloof (1), Durban (24), Umgababa (1), Umhlanga Rocks (2), Cato Ridge (1), Pietermaritzburg (2), Umgeni Valley

(2), Krantzloof (9), Umdoni Park (16), Jozini Dam (2), Ngoye Forest (5), Creighton, Hlabeni mist forest (1), Tongaat (2), Scottburgh (1), Weza Forest (1), Umkomas (5), Illovo River (4), Umgazi River Mouth (1), Sarnia (5), New Hanover (3), Eshowe (1), M'fongosi (2), Zululand (1), Dukuduku Forest (3). **Cape Province:** [Eastern Cape]: Beacon Bay (1), Botha's Hill (1), Umtata (3), Umgazi (2), Port St. John's (4). **Swaziland:** Malagwane Hill, Mbabane (3). **Zimbabwe:** Harare (Salisbury) (17), Mutare (Umtali) (3), Vumba (28), Mt. Selinda (1), Wankie (3), Buhwa Mt., Belingwe (1), Colleen Bawn (1), Ingwesi, Syringa Farm (1). **Botswana:** Maun, Crocodile Camp (1), 16 km NE. Maun (1). **Namibia:** Abachaus (1). **Malawi:** Nkata Bay (4). **Zambia:** Zambezi Rapids, Ikelenge, N. Mwinilunga (1). **Tanzania:** Amani, 1100 m (1), Mts. Livingstone, 30 km S. Njombe, 2400 m (1), Kilimanjaro, 3–4000 m (1), Kilimanjaro, Marungu, 1500 m (1), Morogoro (1), Kigonsera (1). **Kenya:** Nderema (6). **Nigeria:** Kaduna (1). **Cameroon:** W., Victoria, 0–80 m (1). Djutitsa (3), Bare (1). **Madagascar:** C., Parc de Tsimbazaza, 1200 m (10), NE., Maroantsetra (3), E., NW. of Fort Dauphin, Andohalelo Massive, Andranomangana Forest, 1770 m (1), Nossi-Bé (1). **Comoros:** Mohéli, Fomboni, 10 m (1), Mohéli, Djouma-Dounga (1).

### Species removed from *Chiasmia* (‘*Semiothisa*’)

#### 1. ♀’*Semiothisa*’ *cricophera* Prout MS name

not illustrated

‡*Semiothisa cricophera* Prout MS. ‘Holotype’ ♂, [Guinea]: 47.26., Massadou, Nr. Macenta, 1600 ft., 13.–17.v.[19]26, French Guinea (C.L. Collenette); A.L.; Manuscript Name; *Semiothisa cricophera* Prout ♂ type; Joicey Bequest Brit. Mus. 1934–120.; Geometridae genitalia slide No. 16938 (BMNH) [examined].

FURTHER MATERIAL. 1 ♀, **Senegal:** Sédiou, 3–8 July 1917 (H. Castell); Rothschild Bequest B.M. 1939–1; Geometridae genitalia slide No. 16939 (BMNH).

The species was described later by Herbolut as *Xylopteryx dargei* (Herbolut, 1984b: 139).

#### 2. ‘*Semiothisa*’ *peyrierasi* Viette, 1975

Figs 497; 967

*Semiothisa peyrierasi* Viette, 1975: 17. Holotype ♀,

**Madagascar:** Holotype; Madagascar Est, Piste d'Andapa à Ambalapaiso, 25 km Ouest d'Andapa, 725 m, 24.–28.xi.1968 (P. Griveaud, A. Peyrieras et

P. Viette); *Semiothisa peyrierasi* n.sp. Holotype ♀, P.E.L. Viette det. 1975; genitalia slide M. Krüger No. 4 (MNHN) [examined].

FORE WING LENGTH. 15 mm (♀ holotype).

ADULT ♀ (Fig. 497). Chaetosemata in two clearly separated groups (J. Minet, pers. comm.). Hind wing strongly crenulated and forming a series of short tails. Wings rather elongated. Ground colour evenly milk chocolate-brown, with some darker dusting particularly along inner margin of hind wing. Lines nearly wholly reduced to a series of small black dots, their position marked by three black maculae on costa of fore wing. A series of whitish spots running parallel to termen of both wings. Discal spots whitish; minute on fore wing, conspicuous and elliptical on hind wing. Underside very similar. Vestiture of thorax and abdomen concolorous with wings.

FEMALE GENITALIA (Fig. 967). Papillae anales well developed, rounded. Both pairs of apophyses thin, a. anteriores about half length of a. posteriores. Sterigma: l. antevaginalis very large, crescentic. Antrum short and cylindrical. Bursa copulatrix taking the shape of an extremely elongated, membranous tube. Signum small, strongly constricted near centre.

DIAGNOSIS. Quite unmistakable on account of its chocolate brown coloration and the series of small tails on the hind wing.

BIOLOGY. Unknown. The female holotype was collected in November at an altitude of 725 m.

DISTRIBUTION. Madagascar.

MATERIAL. Known from the holotype only.

REMARKS. As the male of *peyrierasi* remains unknown, and the chaetosemata of the female do not show the typical macariine condition, the species is removed from Macariini. Its correct generic and tribal placement are not known.

### Species auctorum (alphabetical):

#### 1. *Psamatodes arenularia* Mabille, 1880

not illustrated

*Psamatodes arenularia* Mabille, 1880: 9. Holotype ♀, [Madagascar] [lost] (Viette & Fletcher, 1968).

*Tephritis arenularia* (Mabille); Herbolut, 1956: 248.

According to the original description, this is a medium-sized species with greyish wings, finely irrorated with black. The description may refer to *Isturgia univirgaria*, although this cannot be established beyond doubt.

## 2. *Macaria destitutaria* Walker, 1861

not illustrated

*Macaria destitutaria* Walker, 1861: 922. Holotype ♀, **South Africa** (not traced in BMNH or OMU) [not examined].

From the original description it remains unclear to what species Walker was referring; the only cinerous species with a wing length of 16 lines that fits the description appears to be *Chiasmia kilimanjarensis* (Holland). However, most of Walker's South African specimens came from the Cape, an area from which *kilimanjarensis* is absent.

## 3. *Fidonia deviaria* Walker, [1863]

not illustrated

*Fidonia?* *deviaria* Walker, [1863]: 1762. Types: **South Africa** (not traced in BMNH or OMU) [not examined].

*Tephriina?* *deviaria* (Walker); Janse, 1917: 112.

‡*Fidonia?* *diviaria* Walker; Janse, 1932: 242. Misspell-ing.

The description given by Walker apparently refers to the variable *Isturgia spissata* (Walker), but the identity cannot be established beyond doubt.

## 4. *Tephriua inaequata* Walker, 1861

not illustrated

*Tephriina* *inaequata* Walker, 1861: 964. Holotype ♀, **South Africa** (not traced in BMNH and OMU) [not examined].

From the original description this is probably not a species of *Isturgia*.

## 5. *Macaria infixaria* Walker, [1863]

not illustrated

*Macaria infixaria* Walker, [1863]: 1645. Holotype ♀, [**South Africa**]: Natal (not traced in BMNH or OMU) [not examined]. A junior homonym of *Macaria infixaria* Walker, 1861: 939 [TASMANIA].

This is probably a synonym of *Chiasmia johnstoni* (Butler).

## 6. *Tephriina laticlippata* Walker, [1863]

not illustrated

*Tephriina laticlippata* Walker, [1863]: 1760. Holotype ♀, **South Africa** (not traced in BMNH or OMU) [not examined].

*Tephriina laticlippata* Walker; Janse, 1917: 112 (as good species); 1932: 242 (under *species auctorum*).

I have been unable to relate the description to a species.

## 7. *Tephriua malesignaria* Mabille, 1880

not illustrated

*Tephriina malesignaria* Mabille, 1880: 8. Holotype ♂, [**Madagascar**] [lost] (Viette & Fletcher, 1968).

*Tephriina malesignaria* Mabille; Herbuleot, 1956: 248.

The description of this species possibly refers to *I. averyi* Viette and would predate it by one hundred years, but its identity cannot be established beyond doubt.

## 8. *Ephyra testacea* Walker, [1863]

not illustrated

*Ephyra testacea* Walker, [1863]: 1575. Holotype ♀, [**Zaire**]: Congo/43 56; *Ephyra testacea* (BMNH) [examined].

*Macaria testacea* (Walker); Hampson, 1910: 468.

The badly damaged holotype is probably referable to *C. sororcula* (Warren). If this interpretation is correct, the name *testacea* would have priority. However, because its identity can no longer be established beyond doubt, the taxon is included under *species auctorum*.

## APPENDIX: 8. Genus *MALGASSOTHISA* Herbuleot, 1966

*Malgassothisa* Herbuleot, 1966: 218. Type species: *Malgassothisa trifida* Herbuleot, 1966, *ibidem*: 218, by monotypy.

DIAGNOSIS. Adult.

GENERAL APPEARANCE (Figs 498, 499). Medium-sized, orange moths (fore wing length 11–13 mm). Apex of fore wing rounded but not broadly so; termen of hind wing rounded. Wing pattern simple and consisting of median and postmedian line on fore wing; discal spots present, large. Head: antennae of ♂ short, bipectinate, leaving apical one-fifth free; of ♀, ciliate, the ciliae being arranged in fascicles. Frons smooth. Labial palpi short, about diameter of eyes. Proboscis fully developed. Legs: hind tibia of ♂ dilated, bearing hair-pencil.

VENATION. (Due to the scarcity of material available for examination, no slide preparation of the wings was

made. The following information is translated from the original description.) 'In fore wing, R<sub>1</sub> and R<sub>2</sub> coincident throughout, touching Sc at one point; the communal stalk of R<sub>3-5</sub> from well before end of cell. In hind wing, Sc+R<sub>1</sub> approximated to R<sub>5</sub> until middle; R<sub>5</sub> from before anterior end of cell; CuA<sub>1</sub> from well before posterior end of cell. Fovea apparently absent.' (A fovea is indeed absent.)

**MALE GENITALIA** (Fig. 744). Uncus dome-shaped, rather small, carrying a pair of sclerotized horns. Gnathos absent. Tegumen and vinculum elongated. Valve with characteristic structure: costa and sacculus completely separated, forming two long arms, and median portion of valve forming a third lobe. Aedeagus spindle-shaped, with a single median cornutus. Octavals absent.

**FEMALE GENITALIA** (Fig. 968). Papillae anales well rounded. Apophyses posteriores short and very thin; a. anteriores stouter. Sterigma forming two large flaps, set at an angle of about 90°. Antrum of macariine type absent. Bursa copulatrix membranous, with small signum.

**DISTRIBUTION.** Madagascar, apparently confined to eastern districts.

**REMARKS.** The affinities of *Malgassothisa* within Macariini remain unclear. The genus shows some macariine characteristics, while others are absent. The chaetosemata are normal; the male of *M. trifida* Herboulot has well-formed uncus horns and cleft, trilobate valvae, but octavals and a fovea are absent; and the female genitalia lack an antrum. Since a secondary loss of the transversely elongated condition of the chaetosemata has apparently occurred elsewhere in Macariini, it seems probable that *Malgassothisa*, which possesses numerous apomorphies, represents a very specialized line of development, comparable to *Lampadopteryx*, *Hypephyra* and *Iridoplecta* in the Oriental region, although its nearest relatives are not known.

The trifid valvae are somewhat reminiscent of the condition observed in *Melanolophia* Hulst (McGuffin, 1977).

## Description of species

### 1. *Malgassothisa trifida* Herboulot, 1966

Figs 498, 499; 744, 968

*Malgassothisa trifida* Herboulot, 1966: 218. Holotype ♂, Madagascar: Type; Madagascar Sud, domaine de l'ouest, route de Tuléar à Ihosy au km 54, 23.XII.1964, Collection Jacques Plante; *Malgassothisa trifida* Hrblt. Type; *Malgassothisa trifida* Hrblt. Bull. Soc. Linn. Lyon, 35e année, 1966,

p. 218; genitalia slide M. Krüger No. 7 (MNHN) [examined].

**FORE WING LENGTH.** 11 mm (♂), 13 mm (♀).

**ADULT** (Figs 498, 499). Antennae of ♂ shortly bipectinate, those of ♀ simple. Apex of fore wing bluntly pointed, termen of hind wing rounded, without projections. Wings vividly orange with some darker dusting in median area and along costa of fore wing. Fore wing with median and postmedian line, hind wing with postmedian only present; all lines straight, yellowish. Discal spots dark and very large on fore wing, absent on hind wing. Underside similar, but discal spots smaller and only postmedian on fore wing visible, dark. Vestiture of thorax and abdomen concolorous with wings, orange on upper- and more yellowish on underside. Hind tibia of ♂ dilated, carrying hair-pencil.

**MALE GENITALIA** (Fig. 744). Uncus broadly triangular, horns rather small. Gnathos absent. Tegumen and vinculum elongated. Valve long, separated into costa, sacculus and two additional lobes (see figure). Aedeagus short and wedge-shaped; vesica with a small median cornutus and some apical striations. Octavals absent.

**FEMALE GENITALIA** (Fig. 968). Papillae anales strongly rounded. Apophyses posteriores delicate; a. anteriores stouter, hardly shorter than the former. Sterigma: l. antevaginalis forming two strongly sclerotized flaps. Antrum of macariine type absent. Bursa copulatrix pear-shaped, membranous except for a discrete, sclerotized area in posterior section of ductus. Signumstellate, small.

**DIAGNOSIS.** The bright orange colour and large, dark discal spot on the fore wing render *M. trifida* quite unmistakable.

**BIOLOGY.** Adults have been collected in December and January.

**DISTRIBUTION.** Madagascar.

**MATERIAL.** 1 ♀ (dissected, MRAC genitalia slide No. 2), 1 Tervuren (MRAC).

**LOCALITIES.** **Madagascar:** Madagascar Ouest, Route nationale 7, 64 km E de Tuléar, Andranovory Forest, 500 m (1).

## REFERENCES

- Acocks, J.P.H. 1953. Veld types of South Africa. *Memoirs of the Botanical Survey of South Africa*, No. 28, 192 pp.
- Acocks, J.P.H. 1975. Veld types of South Africa. *Memoirs of the Botanical Survey of South Africa*, No. 40, 128 pp.
- Acocks, J.P.H. 1988 (O.A. Leistner, editor). Veld types of South Africa. *Memoirs of the Botanical Survey of South Africa*, No. 57, 146 pp.

- Agenjo, R. 1952. *Faunula Lepidopterológica Almeriense*. Consejo Superior de Investigaciones Científicas, Madrid.
- Agenjo, R. 1974. Ocho géneros y veinte especies de Geometridae nuevos para España. *Graellsia*, **27**: 3–21.
- Amsel, G.H. 1935. Weitere Mitteilungen über palästinensische Lepidopteren. *Veröffentlichungen aus dem Deutschen Kolonial- und Übersee-Museum*, **1935** 1 (2): 1–204.
- Andres, A. and Seitz, A. 1924. Die Lepidopteren-Fauna Ägyptens. *Senckenbergiana*, **6**: 13–83.
- Andres, A. and Seitz, A. 1925. Die Lepidopteren-Fauna Ägyptens. Nachtrag zum 1. Teil. *Senckenbergiana*, **7**: 54–61.
- Andrews, P. & van Couvering, J.A.H. 1975. Palaeoenvironments in the East African Miocene. Pp. 62–103 in Szalay, F.S. (ed.), *Approaches to Primate Paleobiology*. Basel.
- Anonymous 1950–1972. *Official Standardized Names approved by the U.S. Board on geographic names*. Geographic Names Division, U.S. Topographic Command, Washington.
- Arnold, T.H. & de Wet, B.C. 1993 (eds.). *Plants of southern Africa: names and distribution. Memoirs of the Botanical Survey of South Africa*, No. **62**: 1–825.
- Audeoud, G. & Roch, M. 1938. Chasses printanières aux Lépidoptères au Maroc. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft*, **17**: 354–373.
- Aurivillius, P.O.C. 1910. In: Sjöstedt, Wissenschaftliche Ergebnisse der schwedischen zoologischen Expedition Kilimandjaro Meru 1905–1906, **9**: 1–56, 2 pl.
- Axelrod, D.I. & Raven, P.H. 1978. Late Cretaceous and Tertiary vegetation history of Africa. Pp. 77–130 in Werger, M.J.A. & Van Bruggen, A.C. (Eds.), *Biogeography and Ecology of Southern Africa*. Junk, The Hague.
- Bastelberger, M.J. 1907. Neue afrikanische Geometriden aus meiner Sammlung. *Internationale Entomologische Zeitschrift*, **1**: 167–168.
- Bastelberger, M.J. 1908. Besprechung und Beschreibung einiger neuer oder sonst interessanter Arten von exotischen Geometriden im Naturhistorischen Museum zu Wiesbaden. *Jahresbericht des Nassauischen Vereins für Natur*, **59**: 71–77.
- Bastelberger, M.J. 1909. Beschreibung eines neuen Genus und fünf neuer Spannerarten aus Angola in meiner Sammlung. *Internationale Entomologische Zeitschrift*, **45**: 281–285.
- Beck, R.A. et alii 1995. Stratigraphic evidence for an early collision between northwest India and Asia. *Nature*, **373**: 55–58.
- Berge, F. & Rebel, H. 1910. *Fr. Berge's Schmetterlingsbuch nach dem gegenwärtigen Stande der Lepidopterologie; neu bearbeitet und herausgegeben von H. Rebel*; 9th edition. E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart.
- Besse, J. & Courtillot, V. 1988. Palaeogeographic Maps of the continents bordering the Indian Ocean since the early Jurassic. *Journal of Geophysical Research*, **93**, No. B10: 11,791–11,808.
- Bethune-Baker, G.T. 1913. Descriptions of new species of Lepidoptera from Africa and the East. *Annals and Magazine of Natural History*, **8** (11): 562–575.
- Blachier, C. 1908. Lépidoptères du Maroc: remarques sur diverses espèces et descriptions de variétés nouvelles. *Annales de la Société entomologique de France*, **77** (2): 209–222.
- Boisduval, J.A. 1840. *Genera et Index methodicus europaeorum Lepidopterorum*. VIII + 240pp. Paris.
- Bonnefille, R. 1984. Cenozoic vegetation and environments of early hominids in East Africa. Pp. 579–612 in Whyte, R.O. (ed.), *The Evolution of the East Asian Environment*, vol. 2. Centre of Asian Studies, University of Hong Kong.
- Bonnefille, R. 1985. Evolution of the continental vegetation: the palaeobotanical record from East Africa. *South African Journal of Science*, **81**: 267–270.
- Brown, J.H. and Gibson, A.C. 1983. *Biogeography*. The C.V. Mosby Company, St. Louis, Toronto, London.
- Bryk, F. 1938. Ein neuer Genus-Namen. *Parnassiana*, **5**: 54.
- Büttiker, W. 1964. New observations on eye-frequenting Lepidoptera from S.E. Asia. *Verhandlungen der Gesellschaft für Natur*, Basel, **75**: 231–236.
- Büttiker, W. 1970. Strange parasites of the eye. *Ciba Symposium*, **17** (1): 22–24.
- Büttiker, W. 1973. Further records of eye-frequenting Noctuidae (Lepidoptera) from South Africa. *South African Journal of Science*, **69**: 337–341.
- Büttiker, W. 1979. First records of eye-frequenting and anthropophilic Lepidoptera from Saudi Arabia. *Fauna of Saudi Arabia*, **1**: 345–351.
- Büttiker, W. and Whellan, J.A. 1966. Records of Eye-frequenting Moths from Rhodesia. *Rhodesia Agricultural Journal, Bulletin*, **2306**: 1–4.
- Butler, A.G. 1875. On a collection of Lepidoptera from southern Africa, with descriptions of new genera and species. *Annals and Magazine of Natural History*, (4) **16**: 394–420.
- Butler, A.G. 1882. Heterocerous Lepidoptera collected in Chili by Thomas Edmonds, Esq. *Transactions of the Entomological Society of London*, **1882**: 339–427.
- Butler, A.G. 1883. On a collection of Indian Lepidoptera received from Lieut.-Colonel Charles Swinhoe; with numerous notes by the collector. *Proceedings of the Zoological Society of London*, **1883**: 144–175.
- Butler, A.G. 1884. On a collection of Lepidoptera made by Major J.W. Yerbury at or near Aden. *Proceedings of the Zoological Society of London*, **1884**: 478–502.
- Butler, A.G. 1893. On two Collections of Lepidoptera sent by H.H. Johnston, Esq., C.B., from British Central Africa. *Proceedings of the Zoological Society of London*, **1893**: 643–684 Ipl.
- Capps, H.W. 1943. Some American geometrid moths of the subfamily Ennominae heretofore associated with or closely related to *Ellopia* Treitschke. *Proceedings of the United States National Museum*, **93**: 115–151.
- Carcasson, R.H. 1964. New African Moths. *Journal of the East African Natural History Society*, **24** (5) 109: 53–82.
- Carpenter, F.M. and Burnham, L. 1985. The geological record of insects. *Annual Review of Earth and Planetary Science*, **13**: 297–314.
- von Christoph, H. 1887. Lepidoptera aus dem Achal-Tekke-Gebiete. Dritter Theil. *Romanoff Mémoirs sur les Lépidoptères*, **8**: 50–125, pls 3–5.
- Clerck, C.A. 1759. *Icones insectorum rariorum cum nonnibus eorum trivialibus, locisque C. Linnaei, etc. Syst. Nat. allegatis. Holmiae*.
- Coates Palgrave, K. 1988. *Trees of southern Africa*. 2nd revised edition. 959 pp., Struik, Cape Town and Johannesburg.
- Coetzee, J. and van der Merwe, C.F. 1994. *Preparation of biological material for electron microscopy*. Manual published by Unit for Electron Microscopy, Faculty of Science, University of Pretoria. 7pp.
- Common, I. 1994. Oecophorine Genera of Australia I: The Wingia Group (Lepidoptera: Oecophoridae). *Monographs on Australian Lepidoptera*, **3**: 1–390.
- Comstock, J.H. and Needham, J.G. 1989/99. *The Wings of Insects*. Reprinted from *The American Naturalist*, vols. **32–33**, 124 pp., 90 figs. Ithaca, New York.
- Conrad, T.A. 1855. Observations on the Eocene deposit of Jackson, Mississippi, with descriptions of thirty-four new species of shells and corals. *Proceedings of the Academy of Natural Sciences of Philadelphia*, **7**(Jan): 257–263.
- Cook, M.A. and Scoble, M.J. 1992. Tympanal organs of geometrid moths: a review of their morphology, function, and systematic importance. *Systematic Entomology*, **17**: 219–232.
- Covell, C.V., Jr. 1984. *A field guide to the moths of eastern North America*. The Peterson Field Guide Series **30**: 500 pp, 64 pl., Boston.
- Crawford-Cabral, J. and Mesquita, L.M. 1989. Índice topônomico de coleitas zoológicas em Angola. *Estudos, ensaios e documentos*, **151**. Instituto de Investigação científica tropical, Lisbon. 206 pp.
- Curtis, J. 1826. *British Entomology*, vol. 3. Plates 99–146. London.
- Debauche, H. 1938. Geometridae (Lep. Het.). *Exploration du Parc National Albert, Mission G.F. de Witte*, fascicule **20**: 1–56, 6 pl.

- Demaison, L.** 1895. Note sur les lépidoptères d'Égypte. *Bulletin Entomologique de France* No.4 in: *Annales de la Société Entomologique de France*, **64**: 59–63.
- Denis, M., and Schiffermüller, I.** 1775. Ankündung [sic] eines systematischen Verzeichnisses der Schmetterlinge der Wiener Gegend, herausgegeben von einigen Lehrern am k. k. Theresianum, Wien. Vienna.
- Desmarest, E.** 1879. Papillons nocturnes. In: Chenu, *Encyclopédie et Histoire Naturelle*, vol. 2. 312pp., Paris.
- Dickson, C.G.C.** 1944. Recently observed food plants of some Cape Lepidoptera. *Journal of the Entomological Society of Southern Africa*, **7**: 96–99.
- Distant, W.L.** 1892. *A Naturalist in the Transvaal*. 277 pp., London.
- Druce, H.** 1888. List of the Lepidoptera Heterocera, with Description of the new Species, collected by Mr. C.M. Woodford at Aola, Guadalcanar Island, Solomon Islands. *Proceedings of the Zoological Society of London*, **1888**: 570–580.
- Dumont, C.** 1932. Les Lépidoptères des Crammiers du Nord de l'Afrique. *Société Entomologique de France, Livre du Centenaire*, pp. 689–719.
- Dunning, D.C., Acharya, L., Merriman, C.B. and Dal Ferro, L.** 1992. Interactions between bats and arctiid moths. *Canadian Journal of Zoology*, **70**: 2218–2223.
- Dunning, D.C. and Krüger, M.** 1996. Predation upon moths by free-foraging *Hippobosca caffer*. *Journal of Mammalogy*, **77** (3): 708–715.
- Duponchel, P.A.J.**, in Godart, J.B. and Duponchel, P.A.J. 1829. *Histoire naturelle des Lépidoptères ou Papillons de France*, vol. 7. Paris.
- Edwards, D.** 1983. A broad-scale structural classification of vegetation for practical purposes. *Bothalia*, **14**: 705–712.
- Eldredge, N. and Gould, S.J.** 1972. Punctuated equilibria. An alternative to phyletic graduation. Pp. 82–115 in: Schopf, T.M. (ed.) *Models in paleobiology*. San Francisco.
- Endrödy-Younga, S.** 1978. Coleoptera. Pp. 797–821 in Werger, M.J.A. and Van Bruggen A.C. (Eds.), *Biogeography and Ecology of Southern Africa*. Junk, The Hague.
- Endrödy-Younga, S.** 1988. Revision of the genus *Anomalipus* Latreille 1846 (Coleoptera: Tenebrionidae: Platynotini). *Transvaal Museum Monograph*, **6**: 1–129.
- Esper, E.J.C.** 1787. Die Schmetterlinge in Abbildungen nach der Natur mit Beschreibungen von Eugenius Johann Christoph Esper. Vierter Theil. Europäische Gattungen. Erlangen im Verlage Wolfgang Walthers.
- Fabricius, J.C.** 1798. *Entomologia systematica emendata et aucta ... adjectis synonymis, locis, observationibus, descriptionibus, Supplementum*. Hafniae.
- Farris, J.S.** 1988. *Hennig86, Reference Manual*. 18pp.
- Fawcett, J.M.** 1915. Notes on a collection of Heterocera made by Mr. W. Feather in British East Africa 1911–12. *Proceedings of the Zoological Society of London*, **1915**: 91–113. 2pl.
- Fawcett, J.M.** 1916. Notes on a collection of Heterocera made by Mr. W. Feather in British East Africa 1911–13. *Proceedings of the Zoological Society of London*, **1916**: 707–737 1pl.
- Felder, C., Felder, R. and Rogenhofer, A.F.** 1864–1875. *Reise der österreichischen Fregatte Novara um die Erde*. Vol. 2 (Atlas), 20 pp. + 140 plates. Vienna.
- Ferguson, D.C.** 1983. Geometridae. In: Hodges, R.W. et alii 1983. *Check List of the Lepidoptera of America North of Mexico*. 284pp. London.
- Ferguson, D.C., in prep.** (Revision of the Macariini of North America. No previous title available.)
- Fletcher, D.S.** 1955. Geometridae. In: *Exploration du Parc National de l'Upemba, I. Mission G. F. de Witte*, **32** (5): 79–92.
- Fletcher, D.S.** 1958a. Geometridae from Tanganyika collected by Dr. Christa Lindemann and Nina Pavlitzki. *Veröffentlichungen der Zoologischen Staatsammlung München*, **5**: 119–143.
- Fletcher, D.S.** 1958b. Geometridae. *Ruwenzori Expedition 1952*, **1** (6): 77–176. London.
- Fletcher, D.S.** 1963. Geometridae. In: *Exploration du Parc National Albert (2ème série)*, fasc. **15** (1): 3–70. Institut des parcs nationaux du Congo et du Rwanda. Brussels.
- Fletcher, D.S.** 1974. A revision of the Old World genus *Zamarada*. *Bulletin of the British Museum (Natural History)*, Entomology Series, Supplement **22**: 1–498 123 pl.
- Fletcher, D.S.** 1978a. Geometridae (Lepidoptera) collected by Dr. J. Szunyoghy in Tanzania. *Acta Zoologica Academiae Scientiarum Hungaricae*, **24** (1–2): 41–105.
- Fletcher, D.S.** 1978b. Lepidoptera Geometridae from Mount Kenya. Scientific Report of the Belgian Mt. Kenya Bio-Expedition 1975, no. 11. *Revue zoologique africaine*, **92** (2): 501–512.
- Fletcher, D.S.** 1979. In: Nye, I.W.B., *The Generic Names of Moths of the World*, vol. 3. Geometroidea. 243pp. London.
- Forbes, W.T.M.** 1948. Lepidoptera of New York and neighbouring states. *2. Memoirs of the Cornell University agricultural Experimental Station*, No. **274**.
- Forster, W. and Wohlfahrt, T.A.** 1981. *Die Schmetterlinge Mitteleuropas*. Band 5, Geometridae. 312 pp. Stuttgart.
- Fraser, S.M. and Lawton, J.H.** 1994. Host range expansion by British moths onto introduced conifers. *Ecological Entomology*, **19** (2): 127–137.
- Freyer, C.F.** 1832. *Neuere Beiträge zur Schmetterlingskunde mit Abbildungen nach der Natur* **1**: 689–719, 78 pl, 2 figs.
- Geyer, C.G.F.** 1837. *Zutrage zur Sammlung exotischer Schmetterlinge*, volume **5**.
- Grote, A.R.** 1873. Descriptions of new North American moths. *Bulletin of the Buffalo Society of Natural Sciences*, **1**: 1–16.
- Grote, A.R.** 1902. Die Gattungsnamen der europäischen Geometriden. *Allgemeine Zeitschrift für Entomologie*, **7**: 470–472.
- Guenée, A.** [1845] 1844. In: Duponchel, *Catalogue méthodique des Lépidoptères d'Europe*. Paris.
- Guenée, A.** [1858]. *Spécies générales des Lépidoptères*. In: Boisduval and Guenée, *Histoire naturelle des Insectes* **10**. 584pp. Paris.
- Gumppenberg, C.F. v.** 1887. Systema Geometrarum zonae temperatariorum septentrionalis. Systematische Bearbeitung der Spanner der nördlichen gemäßigten Zone. Erster Theil. *Nova Acta Academiae Caesareae Leopoldino-Carolinae germanicae naturae curiosorum*, **49**: 229–400, pl. VIII–X.
- Hampson, G.F.** 1895. *Fauna of British India. Moths*, vol. 3. 546pp., London.
- Hampson, G.F.** 1908. On the moths collected during the cruise of the 'Valhalla' during the winter 1905–06 by Mr. E.G.B. Mcade-Waldo. *Annals and Magazine of Natural History*, **8** (1): 474–491.
- Hampson, G.F.** 1909. Ruwenzori Expedition Reports. 11. Lepidoptera Heterocera. *Transactions of the Zoological Society of London*, **1909**: 103–137.
- Hampson, G.F.** 1910. Zoological collections from Northern Rhodesia and adjacent territories. *Proceedings of the Zoological Society of London*, **1910**: 388–510.
- Hausmann, A.** 1990. *Enconista rubrior* sp.n. aus West-Marokko mit weiteren Anmerkungen zur Gattung *Enconista* Lederer (Lepidoptera, Geometridae, Ennominae). *Nachrichtenblatt der bayerischen Entomologen*, **39** (4): 104–110.
- Hausmann, A.** 1991. Beitrag zur Geometridenfauna Palästinas: Die Spanner der Klapperich-Ausbeute aus Jordanien (Lepidoptera, Geometridae). *Mitteilungen der Münchner Entomologischen Gesellschaft*, **81**: 111–163.
- Hausmann, A. and Lenz, J.** 1993. Zum Status von *Enconista miniosaria gabriellae* da Silva Cruz 1978 (Lepidoptera: Geometridae). *Entomologische Zeitschrift mit Insektenbörse*, **103** (20): 376–379.
- Hemming, F.** 1937. *Hübner. A bibliographical and systematic account of the entomological works of Jacob Hübner and of the supplements thereto by Carl Geyer, Gottfried Franz von Frölich and Gottlieb August Wilhelm Herrich-Schäffer*. Vol. 1, 605 pp; vol. 2, 274 pp. Royal Entomological Society, London.
- Heppner, J.B. and Lamas, G.** 1982. Acronyms for World Museum Collections of Insects, with an Emphasis on Neotropical Lepidoptera. *Bulletin of the Entomological Society of America*, **28** (3): 305–315.
- Herbulot, C.** 1954a. Nouveaux Geometridae Malgaches. *Mémoires de*

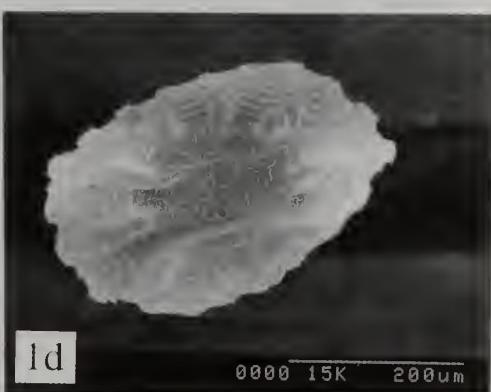
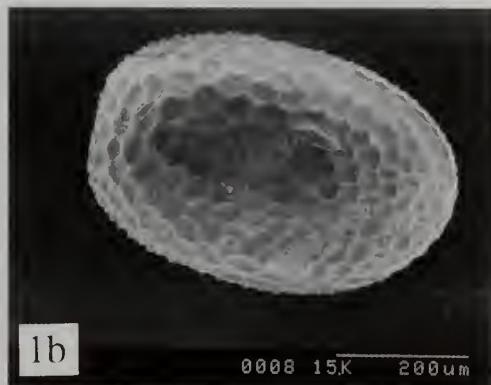
- l'Institut Scientifique de Madagascar (Entomologie)*, **5**: 81–123.
- Herbulot, C.** 1954b. La réserve naturelle intégrale du Mont Nimba. 24. Lépidoptères Géometrides. *Mémoires du Institut françois de l'Afrique noire* **40**: 301–333, Figs. 1–17, pl. 1.
- Herbulot, C.** 1956. Liste des Ennominae de Madagascar [Lepidoptera Geometridae]. *Le Noturoliste Molgoche*, **8** (2): 243–260.
- Herbulot, C.** 1957. Nouvelles formes de Geometridae d'Europe occidentale et d'Afrique du Nord. *Bulletin mensuel de la Société linnéenne de Lyon*, **26**: 190–192.
- Herbulot, C.** 1964. Lépidoptères Geometridae du Haut Sambirano (Madagascar). *Bulletin de la Société entomologique de France*, **69**: 253–258.
- Herbulot, C.** 1966. Nouveaux Geometridae du Sud-Ouest de Madagascar. *Bulletin mensuel de la Société linnéenne de Lyon*, **35** (5): 216–221.
- Herbulot, C.** 1972. Lepidoptera Geometridae de l'Andringitra [Madagascar Centre]. *Bulletin de la Société entomologique de France*, **77**: 140–154.
- Herbulot, C.** 1973a. Nouveaux Ennominae de l'Ouest du Cameroun. *Annales de la Faculté des Sciences du Cameroun*, **13**: 67–76.
- Herbulot, C.** 1973b. Description de quatre nouveaux Ennominae du Cameroun (Lepidoptera Geometridae). *Annales de la Faculté des Sciences du Cameroun*, **15–16**: 57–62.
- Herbulot, C.** 1978. Faune entomologique de l'archipel des Comores. *Mémoires du Muséum National d'Histoire Naturelle* (série A), **109**: 149–167.
- Herbulot, C.** 1980. Mission P. Viette à la Grande Comore, Lepidoptera Geometridae. *Bulletin de la Société entomologique de France*, **85**: 266–273.
- Herbulot, C.** 1981a. Mission entomologique du Musée Royal de l'Afrique Centrale aux Monts Uluguru, Tanzanie (L.Berger, N. Leleup et J. Debecker, V–VIII.1971). *Revue zoologique africaine*, **95** (1): 216–226.
- Herbulot, C.** 1981b. Note sur les *Ectropis* malgaches. *Revue françoise d'Entomologie (Nouvelle Série)*, **3**: 133–137.
- Herbulot, C.** 1984a. Les types de Geometridae décrits par Daniel Lucas (Lepidoptera). *Miscellaneo Entomologico (Revue Entomologique Internationale)*, **50**: 47–52.
- Herbulot, C.** 1984b. Nouveaux Xylopteryx du Cameroun, du Rwanda et du Kenya. *Miscellaneo Entomologica*, **50**: 135–139.
- Herbulot, C.** 1987. Nouveaux *Semiothisa* africains (Lepidoptera: Geometridae). *Tinea*, **12** (suppl.): 276–284.
- Herbulot, C.** 1988. Expédition H. de Toulgoët 1987 en Guyane Française (Lepidoptera, Geometridae). *Miscellanea Entomologico*, **51**: 111–120.
- Herbulot, C.** 1989. Nouveaux Ennominae d'Afrique intertropicale et de Madagascar (Lepidoptera: Geometridae). *Lambillionea*, **89** (1–2): 3–11.
- Herbulot, C.** 1991. Lépidoptères Géometrides récoltés dans l'île de Principe par le Dr. J.G. Canu. *Nouvelle Revue d'Entomologie*, nouvelle série, **8** (2): 203–209.
- Hermosa, A.E.** 1985. Apuntes sobre la familia Geometridae. *Shilap, Revista lepidopterologica*, **13** (49): 27–31.
- Herrich-Schäffer, G.A.W.** [1847] 1843–1856. *Systematische Bearbeitung der Schmetterlinge von Europa*. 2. und 3. Band. Regensburg.
- Herrich-Schäffer, G.A.W.** [1856] 1850–1858. *Sammlung neuer oder wenig bekannter aussereuropäischer Schmetterlinge*. Band 1, 84 pp. 120 pl. Regensburg.
- Hodges, R.W. et alii** (eds) 1983. *Check list of the Lepidoptera of America north of Mexico including Greenland*. xxiv+284 pp. E.W. Classey Limited and The Wedge Entomological Research Foundation, London.
- Holland, W.J.** 1892. Description of some new species of African Lepidoptera. *The Entomologist*, **25** (suppl.): 89–95.
- Holland, W.J.** 1897. List of the Lepidoptera Heterocera collected by Dr. A. Donaldson-Smith. Pp. 408–420 I pl. in: Smith, A. Donaldson, *Through unknown African Countries. The first expedition from Somaliland to Lake Rudolf*. E. Arnold, London and New York.
- Holloway, J.D.** 1994. The Moths of Borneo: Family Geometridae, subfamily Ennominae; part II. *Moloyan Noture Journol*, **47**: 1–309, 593 figs 19 pl.
- Hua, B. and Scoble, M.J.** in prep. *The Costa Rican species of Semiothisa Hübner and Macaria Curtis (Lepidoptero: Geometridae: Ennominae: Macarini).*
- Hübner, J.** [1818]–[1819] 1796. *Sammlung europäischer Schmetterlinge*. Bd. **5**: 234 pl. Augsburg.
- Hübner, J.** [1823] 1816. *Verzeichnis bekannter Schmettlinge* [sic]. 431pp. Anziger 72pp. Augsburg.
- Hübner, J.** [1831] 1825. *Zuräge zur Sammlung exotischer Schmetterlinge*. Augsburg.
- Hulst, G.D.** 1896. A classification of the Geometrina of North America, with descriptions of new genera and species. *Transactions of the American Entomological Society*, **23**: 245–384.
- Inoue, H.** 1986. Further new and unrecorded species of the Geometridae from Taiwan with some synonymic notes (Lepidoptera). *Bulletin of Faculty of Domestic Sciences, Otsuma Women's University*, **22**: 211–267.
- International Code of Zoological Nomenclature** 1985. 3rd edition, adopted by the XX General Assembly of the International Union of Biological Sciences. xx + 338pp. University of California Press, Berkeley and Los Angeles.
- Janse, A.J.T.** 1917. *Check-list of the South African Lepidoptero Heterocera*. 219pp. Pretoria.
- Janse, A.J.T.** 1932. *The Moths of South Africa*, vol. 1. 376pp. 15pl. Transvaal Museum, Pretoria.
- Janse, A.J.T.** 1933–35. *The Moths of South Africa*, vol. 2. 448pp. 15pl. Transvaal Museum. Pretoria.
- Janse, A.J.T.** 1937–39. *The Moths of South Africa*, vol. 3. 435pp. (plates published separately). Transvaal Museum. Pretoria.
- de Joannis, S.J.** 1912. Le genre *Enconista* et ses alliés. *Broterio (Zoology)*, **10**: 5–28.
- Kennel, J. and Eggers, F.** 1933. Die abdominalen Tympanalorgane der Lepidopteren. *Zoologische Jahrbücher, Abteilung für Anatomie und Ontogenie der Tiere*, **57** (1): 1–104.
- Klots, A.B.** 1970. Lepidoptera. In: Tuxen, *Taxonomists' glossary of genitalia in insects*, pp. 115–130. Munksgaard, Copenhagen.
- Koch, M.** 1984. *Wir bestimmen Schmetterlinge*. Neumann, Neudamm. 792 pp.
- Kolenati, F.A.** 1846. *Insecta Caucasi: Coleoptera, Dermaptera, Lepidoptera, Neuroptera, Mutilidae, Aphaniptera, Anoplura, Meletemata entomologica*, **5**: 169pp.; pl. 17–19.
- Krüger, M. and Scoble, M.J.** 1992. Neotropical red-brown Ennominae in the genera *Thysanopyga* Herrich-Schäffer and *Perissopteryx* Warren (Lepidoptera: Geometridae). *Bulletin of the British Museum of Natural History (Entomology)*, **61** (2): 77–148.
- Le Cerf, F.** 1922. Lépidoptères Hétérocères. Pp. 387–482 in: Voyage Baron Maurice de Rothschild en Éthiopie et en Afrique Orientale Anglaise (1904–05).
- Le Cerf, F.** 1923. Lépidoptères nouveaux recueillis au Maroc par M. H. Uengmach. *Bulletin de la Société entomologique de France*, **1923**: 197–200.
- Le Cerf, F.** 1924. Contribution à la faune des Lépidoptères de l'Érythrée. *Annales de la Société entomologique de France*, **93**: 193–210.
- Lederer, J.** 1853. Die Spanner. *Verhandlungen des Zoologisch-Botanischen Vereins in Wien, Abhandlungen*, **3**: 165–270, 2 pl.
- Lederer, J.** 1855. Beitrag zur Schmetterlings-Fauna von Cypern. Beirut, und einem Theile Klein-Asiens. *Verhandlungen des Zoologisch-Botanischen Vereins in Wien, Abhandlungen*, **5**: 174–254.
- Lefebvre, A.** 1831. Classe IX; Insectes. Planches 1 à 40 in: Guérin, *Mogosin de Zoologie, d'Anatomie etc*. Paris 1831–1849.
- Leistner, O.A. and Morris, J.W.** 1976. South African Place Names. *Annals of the Cape Provincial Museums*, **12**: 1–565. Grahamstown.
- Leraut, P.** 1980. Liste des Lépidoptères de France, Belgique et Corse. Supplement to *Alexanor*, 334 pp. Paris.
- Linnæus, C.** 1758. *Systema Nominorum* 10th edition. Vol. 1, *Regnum animale*. 824 pp. Holmiae.

- Lucas, D.** 1932a. Lépidoptères nouveaux de la France occidentale et de l'Afrique du Nord. *Bulletin de la Société entomologique de France*, **37**: 166–169.
- Lucas, D.** 1932b. Sur le genre *Jugurthia* Oberthür [Lep.]. *Bulletin de la Société entomologique de France*, **37**: 216.
- Lucas, D.** 1938. Contribution à l'étude des Lépidoptères de la France et de l'Afrique du Nord. *Bulletin de la Société entomologique de France*, **43**: 181–185.
- Lucas, D.** 1948. Contribution à la faune des Lépidoptères de l'Afrique du Nord. *Bulletin de la Société entomologique de France*, **53**: 88–90.
- Lucas, D.** 1949. Contribution à la faune des Lépidoptères de l'Afrique du Nord. *Bulletin de la Société entomologique de France*, **54**: 96.
- Mabille, P.** 1880. Diagnoses Lepidopterorum Malgassicum. *Comptes-rendus de la Société entomologique de Belgique*, **23**: 16–27.
- Mabille, P.** 1890. Voyage de M. Ch. Alluaud dans le territoire d'Abyssinie (Afrique occidentale) en juillet et août 1886 4 (1): Lépidoptères avec des notes sur quelques autres espèces d'Afrique. *Annales de la Société entomologique de France*, **(6) 10**: 17–54.
- Mabille, P.** 1897. Description de Lépidoptères nouveaux. *Annales de la Société entomologique de France*, **66**: 182–231.
- Mabille, P.** 1900. Lepidoptera nova malgassica et africana. *Annales de la Société entomologique de France*, **68**: 723–753.
- McGuffin, W.C.** 1972. Guide to the Geometridae of Canada (Lepidoptera) II. Subfamily Ennominae. *Memoirs of the Entomological Society of Canada*, **86**: 1–159.
- McGuffin, W.C.** 1977. Guide to the Geometridae of Canada (Lepidoptera) II. Subfamily Ennominae 2. *Memoirs of the Entomological Society of Canada*, **101**: 1–191.
- McGuffin, W.C.** 1987. Guide to the Geometridae of Canada (Lepidoptera) II. Subfamily Ennominae 4. *Memoirs of the Entomological Society of Canada*, **138**: 1–182.
- Meade-Waldo, E.G.B.** 1905. Moths collected in Morocco. *Transactions of the Entomological Society of London*, **1905**: 381–393.
- Meyrick, E.** 1891. Revision of Australian Lepidoptera. *Proceedings of the Linnean Society of New South Wales* (2nd series), **6**: 587–678.
- Möschler, H.B.** 1887. Beiträge zur Schmetterlings-Fauna der Goldküste. *Abhandlungen der Senckenbergischen Naturforschenden Gesellschaft*, **15** (1): 49–100 1 pl.
- Moore, F.** 1882–87. *Lepidoptera of Ceylon. Heterocera*, vols. 2 and 3. London.
- Mosher, E.** 1916. A classification of the Lepidoptera based on characters of the pupa. *Bulletin of the Illinois State Laboratory of Natural History*, **12** (2): 13–159.
- Moucha, J. and Povolny, D.** 1957. Zur kritischen Revision der Gattung *Narraga* Wkr. (Lep. Geometridae). *Acta Societatis entomologicae czechosloveniae*, **54**: 217–234.
- Myers, A.A. and Giller, P.S.** 1988. *Analytical Biogeography*. Chapman and Hall, London. 578 pp.
- Nielsen, E.S., Edwards, E.D. and Rangsi, T.V.** 1996. Checklist of the Lepidoptera of Australia. *Monographs on Australian Lepidoptera*, **4**: xiv+529 pp. CSIRO, Canberra.
- Norton, I.O. and Slater, J.G.** 1979. A model for the evolution of the Indian Ocean and the breakup of Gondwanaland. *Journal of Geophysical Research*, **84**: 6803–6830.
- Oberthür, C.** 1876. Faune des Lépidoptères d'Algérie. In: *Études d'Entomologie*, **1**: 1–74, 5 pl. Rennes.
- Oberthür, C.** 1922. Les Lépidoptères du Maroc. In: *Études de Lépidoptérologie Comparée*, XIX/I: 1–323.
- Oberthür, C.** 1923. Révision iconographique des espèces de Phalénites énumérées et décrites par Guenée, dans le volume X du Spécies Général des Lépidoptères. In: *Études de Lépidoptérologie Comparée*, **20**: 213–283, pl. 549–561. Rennes.
- Packard, A.S.** 1873. Descriptions of new American Phalaenidae. *Fifth Annual Report of the Peabody Academy of Sciences*, pp. 52–81.
- Packard, A.S.** 1876. Monograph of the geometrid moths. In: Hayden, F.V., *U.S. Geological Survey of the Territories* **10**: 594 pp. 13 pl.
- Pagenstecher, A.** 1907. In: Voeltzkow, A., *Reise in Ostafrika in den Jahren 1903–1905. Wissenschaftliche Ergebnisse 2. Systematische Arbeiten. Lepidoptera-Heterocera (Uranidae, Geometridae, Noctuidae, Pyralidae, Thyrididae, Pterophoridae) von Madagaskar, den Comoren und Ostafrika*: 93–146. Stuttgart.
- Paulian, R. and Viette, P.E.L.** 1955. Essai d'un catalogue biologique des Lépidoptères Hétérocères de Tananarive. *Mémoires de l'institut Scientifique de Madagascar (Entomologie)*, **6**: 141–281.
- Pinhey, E.C.G.** 1975. *Moths of southern Africa*. 273pp., Tafelberg Publishers, Cape Town.
- Pinhey, E.C.G.** 1978. Lepidoptera. Pp. 763–773 in: Weger, M.J.A. and Van Bruggen A.C. (Eds.), *Biogeography and Ecology of Southern Africa*. Junk, The Hague.
- Pinker, R.** 1978. Zwei neue Spanner von den Kanaren (Lep., Geometridae). *Nachrichtenblatt der bayerischen Entomologen*, **27** (2): 17–20.
- Platt, E.E.** 1921. List of foodplants of some South African lepidopterous larvae. *South African Journal of Natural History*, **3**: 65–138.
- Potts, R. and Behrensmeyer, A.K.** 1992. Late Cenozoic Terrestrial Ecosystems. Chapter 7 (Pp. 418–541) in: Behrensmeyer, A.K. et alii, *Terrestrial Ecosystems through Time*. The University of Chicago Press, 568 pp.
- Povolny, D. and Moucha, J.** 1959. Kritische Bemerkungen zu einigen Geometriden-Gattungen II. (Lep., Geometridae: *Narraga*, *Isturgia*, *Epelis*). *Acta entomologica Musei nationalis Pragae*, **33**: 453–460.
- Powell, H. and Rungs, C.E.E.** 1942. See Rungs, C.E.E. 1942.
- Prout, L.B.** 1913. New South African Geometridae. *Annals of the Transvaal Museum*, **3** (4): 194–225.
- Prout, L.B.** 1915a. New Genera and Species of African Geometridae. *Novitates zoologicae*, **22**: 311–385.
- Prout, L.B.** 1915b. Die spannerartigen Nachtfalter. In: Seitz, A., *Die Gross-Schmetterlinge der Erde*, Band 4. 479 pp, 25 pl. A. Kernen, Stuttgart.
- Prout, L.B.** 1916a. New South African Geometridae. *Annals of the Transvaal Museum*, **5** (3): 151–179.
- Prout, L.B.** 1916b. Geometridae. In: Poulton, E.B., On a collection of moths made in Somaliland by Mr. W. Feather. *Proceedings of the Zoological Society of London*, **1916**: 91–182.
- Prout, L.B.** 1916c. New African Geometridae. *Novitates zoologicae*, **23**: 272–286.
- Prout, L.B.** 1917a. New Geometridae in the Joicey Collection. *Annals and Magazine of Natural History*, **8** (20): 108–128, 1pl.
- Prout, L.B.** 1917b. New Geometridae (Lepidoptera) in the South African Museum. *Annals of the South African Museum*, **17** (1): 47–77.
- Prout, L.B.** 1921. Moths of Mesopotamia and N.W. Persia. Part III, Geometridae. *Journal of the Bombay Natural History Society*, **28** (1): 187–191.
- Prout, L.B.** 1922a. New South African Heterocera. *Annals of the Transvaal Museum*, **8** (3): 149–186, 1pl.
- Prout, L.B.** 1922b. New and little-known Geometridae. *Novitates zoologicae*, **29**: 327–363.
- Prout, L.B.** 1923. New species and forms of Geometridae. *Annals and Magazine of Natural History*, **9** (11): 305–322.
- Prout, L.B.** 1925. New Species of Geometridae (Lepidoptera) in the Collections of the South African Museum. *Annals of the South African Museum*, **19**: 579–600, 2 pls.
- Prout, L.B.** 1926a. Zoological Results of the Swedish Expedition to Central Africa 1921. Insecta: 20. Lepidoptera Geometridae. *Arkiv för Zoologi* (utgivet av K. Svenska Vetenskapsakademien), vol. 18a, no.25 1–17.
- Prout, L.B.** 1926b. New Geometridae in the Tring Museum. *Novitates zoologicae*, **33**: 179–188.
- Prout, L.B.** 1928a. New Geometridae. *Novitates zoologicae*, **34**: 53–70.
- Prout, L.B.** 1928b. Nouvelles Geometridae africaines. *Bulletin de la Société Lépidoptérologique de Genève*, **6** (1): 19–32.
- Prout, L.B.** 1928c. Geometridae. In: Talbot, G., Prout, A.E., and Prout, L.B., New Heterocera from Morocco. *Bulletin of the Hill Museum*, **2**: 32–37.

- Prout, L.B.** 1928d. Geometridae. In: Le Cerf, F. and Talbot, G., Lepidoptera collected during a zoological mission to the Great Atlas of Morocco 1925. *Bulletin of the Hill Museum*, 2: 113–121.
- Prout, L.B.** 1931. A list of the Geometridae collected by Mr. C.L. Collenette in British Somaliland, with Descriptions of new Species. *Annals and Magazine of Natural History*, 10 (7): 262–272.
- Prout, L.B.** 1932a. Voyage de Ch. Alluaud et R. Jeannel en Afrique orientale (1911–1912). Insectes Lépidoptères III: Geometridae. *Mémoires de la Société Zoologique de France*, 29 (5): 375–512.
- Prout, L.B.** 1932b. New Geometridae from Congo Belge. *Revue de Zoologie et de Botanique Africaines*, 21 (3): 241–250.
- Prout, L.B.** 1934a. New species and subspecies of Geometridae. *Novitates zoologicae*, 39: 99–136.
- Prout, L.B.** 1934b. New Congo Geometridae. *Revue de Zoologie et de Botanique Africaines*, 26 (1): 82–97.
- Prout, L.B.** 1935. Scientific results of the Vernay-Lang Kalahari Expedition, March to September 1930. The Geometridae. *Annals of the Transvaal Museum*, 17 (1): 1–13.
- Rebel, H.** 1907. Zoologische Ergebnisse der Expedition der Kaiserlichen Akademie der Wissenschaften nach Südarabien und Sokotra im Jahre 1898/99, Lepidopteren. *Denkschriften der Kaiserlichen Akademie der Wissenschaften*, Wien, 71 (2): 31–129.
- Rebel, H.** 1931. Zoologische Ergebnisse der Expedition der Kaiserlichen Akademie der Wissenschaften nach Südarabien und Sokotra im Jahre 1898/99, Lepidopteren. *Denkschriften der Kaiserlichen Akademie der Wissenschaften*, Wien, 71 (2): 31–129. [A verbatim reprint of Rebel 1907.]
- Riek, E.E.** 1976. A new collection of insects from the Upper Triassic of South Africa. *Annals of the Natal Museum*, 22: 791–820.
- Risso, A.** 1826. *Histoire naturelle des principales productions de l'Europe méridionale et particulièrement de celles des environs de Nice et des Alpes Maritimes*. Vol. 4. 439pp 12 pl.
- Robinson, G.S.** 1976. The preparation of slides of Lepidoptera genitalia with special reference to the Microlepidoptera. *Entomologist's Gazette*, 27: 127–132.
- Rödel, I. and Trusch, R.** 1997. Zur Biologie, Ökologie und Verbreitung von *Bichroma famulo* (Esper 1787) in Deutschland (Lep., Geometridae). *Entomologische Nachrichten und Berichte*, 41: 19–26.
- Rothschild, L.W.** 1912. New Mauretanian moths. *Novitates zoologicae*, 19: 125–127.
- Rothschild, L.W.** 1914. A preliminary account of the lepidopterous fauna of Guelt-es-Stel, Central Algeria. *Novitates zoologicae*, 21: 299–357.
- Rothschild, L.W.** 1921. On the Lepidoptera collected by Capt. A. Buchanan in Northern Nigeria and the southern Sahara in 1919–1920. *Novitates zoologicae*, 28 (1): 142–170.
- Rothschild, L.W.** 1925. On the Lepidoptera collected by Dr. E. Hartert and F. Young in Morocco in April and May 1924. *Bulletin de la Société des sciences naturelles et physiques du Maroc*, 52: 126–152.
- Rungs, C.E.E.** 1942. Notes de lépidoptérologie marocaine. 11: Additions à la faune du Maroc; Lépidoptères des régions sahariennes. *Bulletin de la Société des sciences naturelles et physiques du Maroc*, 22: 158–178.
- Rungs, C.E.E.** 1945. Contribution à la connaissance des lépidoptères du Sahara Nord Occidental. *Eos*, 21: 7–43.
- Rungs, C.E.E.** 1954. La chenille arpenteuse de l'*Acacia* à tanin. Service de la défense des Végétaux, travaux originaux, 5: 1–55.
- Rungs, C.E.E.** 1967. Notes de lépidoptérologie marocaine (25). *Bulletin de la Société entomologique de France*, 72: 104–114 189–201, figs, pls 6, 7.
- Rungs, C.E.E.** 1981. Catalogue raisonné des Lépidoptères du Maroc, Tome II. *Travaux de l'Institut Scientifique*, Série Zoologie, 40: 275 pp.
- Rutherford, M.C. and Westfall, R.H.** 1986. Biomes of southern Africa – an objective categorization. *Memoirs of the Botanical Survey of South Africa*, 54: 1–98.
- Saalmüller, M.** 1880. Neue Lepidopteren aus Madagaskar, die sich im Museum der Senckenberg'schen naturforschenden Gesellschaft befinden. *Berichte der naturforschenden Senckenberg'schen Gesellschaft*, 1880: 258–310.
- Saalmüller, M. and von Heyden, L.** 1891. *Lepidopteren von Madagaskar*. 2. Abtheilung, pp. 247–531, 14 pl. Frankfurt.
- Salkeld, E.H.** 1983. A catalogue of the eggs of some Canadian Geometridae. *Memoirs of the Entomological Society of Canada*, 126: 1–167.
- Sauter, W.** 1992. Zur systematischen Stellung von *Holia berytorio* Stgr. (Lepidoptera, Geometridae). *Noto lepidopterologico*, Suppl. 4: 159–163.
- Schmidlin, A.** 1964. Übersicht über die europäischen Arten der Familie Geometridae (Lep.). *Mitteilungen der entomologischen Gesellschaft Basel*, 14 (4–5): 121–137.
- Scoble, M.J.** 1992. *The Lepidoptero – Form, Function and Diversity*. Oxford University Press, 404 pp.
- Scoble, M.J. (Ed.)** 1999. *Geometer Moths of the World. A Catalogue*. Vol. 1, xxv, pp. 1–482; vol. 2, pp. 483–1016 plus Index and CD-ROM. CSIRO Publishing, Collingwood.
- Scoble, M.J. & Krüger, M.** (in press). A review of the genera of Macarini with a revised classification of the tribe (Geometridae: Ennominae). *Zoological Journal of the Linnean Society*.
- Seyffer, E.J.** 1850. Verzeichniss und Beobachtungen über die Württemberg vorkommenden Lepidopteren. *Jahreshefte des Vereins für vaterländische Naturkunde Württembergs*, 5: 76–123.
- Silva Cruz, da, M.A.** 1978. Une sous-espèce nouvelle de *Enconisto miniosaria* (Dup.) et une autre de *Coscinia cibrorio* (L.) (Lepidoptera). *Publicaciones del Instituto Zoológico Dr. Augusto Nobre*, (Porto), 143: 12.
- Smith, J.B.** 1891. *List of the Lepidoptera of Boreal America*. Philadelphia.
- Snellen, P.C.T.** 1872. Bijdrage tot de Vlinder-Fauna van Neder-Guinea, zuidwestelijk gedeelte van Afrika. *Tijdschrift voor Entomologie*, 15: 1–50, 3 pl.
- Snellen, P.C.T.** 1882. Aantekeningen over Afrikaansche Lepidoptera. *Tijdschrift voor Entomologie*, 2: 215–234.
- Spuler, A.** 1910. *Die Schmetterlinge Europas*. Band 2. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart.
- Staudinger, O.** 1892. Neue Arten und Varietäten von palaearktischen Geometriden aus meiner Sammlung. *Deutsche Entomologische Zeitschrift 'Iris'*, 5: 141–260.
- Staudinger, O.** 1897. Neue Lepidopteren aus Palästina. *Deutsche Entomologische Zeitschrift 'Iris'*, 10: 271–319.
- Staudinger, O. and Wocke, M.** 1871. *Katalog der Lepidopteren des europäischen Fonnengebietes*. 426 pp., Dresden.
- Staudinger, O. and Rebel, H.** 1901. *Catalog der Lepidopteren des palaearktischen Fonnengebietes*. 3. Auflage, 368 pp. Berlin.
- Stephens, J.F.** 1829. *The Nomenclature of British Insects*. London.
- Stephens, J.F.** 1835. *Illustrations of British Entomology* (Hausstellata), vol. 4. London.
- Stehr, F.W.** 1987. Geometridae (Geometroidea). Pp. 502–507 in: Stehr: *Innate Insects*. 754pp. Dubuque, Iowa.
- Strand, E.** 1912. Über Lepidopteren aus Mkatta und Morogoro in Deutsch Ost-Afrika, nebst Beiträgen zur Kenntnis der *Torogomone*-Arten. *Archiv für Naturgeschichte*, 78: 67–92.
- Strand, E.** 1915. Lepidoptera aus Bonaberi in Kamerun. *Entomologische Mitteilungen*, 4: 173–194.
- Swinhoe, C.** 1884. On Lepidoptera collected at Kurrahee. *Proceedings of the Zoological Society of London*, 1884: 503–529.
- Swinhoe, C.** 1885. On the Lepidoptera of Bombay and the Deccan. Part 4. Heterocera (continued). *Proceedings of the Zoological Society of London*, 1885: 852–886.
- Swinhoe, C.** 1900. *Catalogue of Eastern and Australion Lepidoptero Heterocera in the Collection of the Oxford University Museum. II: Noctuina, Geometrina and Pyrolidina*. 630pp, 8 pl. Oxford.
- Swinhoe, C.** 1904. On the Geometridae of tropical Africa in the national collection. *Transactions of the Entomological Society of London*, 1904: 497–590.
- Swofford, D.L.** 1985. *PAUP, Phylogenetic Analysis Using Parsimony*, version 2.4. Distributed by Illinois Natural History Survey.

- Swofford, D.L.** 1993. *PAUP, Phylogenetic Analysis Using Parsimony*, version 3.1.2d5 for Macintosh computers.
- Tarling, D.H.** 1972. Another Gondwanaland. *Nature*, **238**: 92–93.
- Taylor, J.S.** 1946. Food-plants of some South African Lepidoptera. *Journal of the Entomological Society of Southern Africa*, **9**: 45–48.
- Taylor, J.S.** 1949. Notes on Lepidoptera in the Eastern Cape Province, part I. *Journal of the Entomological Society of Southern Africa*, **12**: 78–95.
- Taylor, J.S.** 1951. Notes on Lepidoptera in the Eastern Cape Province, part II. *Journal of the Entomological Society of Southern Africa*, **14**: 4–126.
- Taylor, J.S.** 1953. Notes on Lepidoptera in the Eastern Cape Province, part III. *Journal of the Entomological Society of Southern Africa*, **16**: 143–167.
- Taylor, J.S.** 1965. Notes on Lepidoptera in the Eastern Cape Province – 5. *Journal of the Entomological Society of Southern Africa*, **28**: 137–154.
- Toulgoët, H.** de 1963. Week-end entomologique à Ifrane (Moyen-Atlas). *Alexanor*, **3**: 41–45.
- Toulgoët, H.** de 1966. Quinze jours de chasse au Maroc. *Alexanor*, **4**: 197–207.
- Treitschke, F.W.**, in Ochsenheimer 1827–1828. Geometridae. In: *Die Schmetterlinge von Europa* (Fortsetzung des Ochsenheimer'schen Werkes) 6. Band 1 Abt. 444pp. Leipzig.
- Tremewan, W.G.** 1988. C.F. Freyer's Neuere Beiträge zur Schmetterlingskunde mit Abbildungen nach der Natur. *Bulletin of the British Museum of Natural History, (historical Series)* **16** (1): 1–16.
- Turner, A.J.** 1917. Revision of Australian Lepidoptera, VI. *Proceedings of the Linnean Society of New South Wales*, **42**: 304–336, 344–390.
- Tuxen, S.L.** 1956 (ed.). *Taxonomist's glossary of genitalia in insects*. 284pp. Munksgaard, Copenhagen.
- Van Zinderen Bakker Sr., E.M.** 1978. Quaternary vegetation changes in southern Africa. Pp. 131–143 in Werger, M.J.A. and Van Bruggen A.C. (Eds.), *Biogeography and Ecology of Southern Africa*. Junk, The Hague.
- Van Zinderen Bakker Sr., E.M. and Mercer, J.H.** 1986. Major late Cainozoic climatic events and palaeoenvironmental changes in Africa viewed in a world wide context. *Palaeogeography, Palaeoclimatology, Palaeoecology*, **56**: 217–235.
- Vári, L. and Kroon, D.M.** 1986. *Southern African Lepidoptera. A series of cross-referenced indices*. The Lepidopterists' Society and The Transvaal Museum, 198pp. Pretoria.
- Viette, P.E.L.** 1973. Lepidoptera Geometridae de Madagascar nouveaux ou peu connus. *Bulletin mensuel de la Société Linnéenne de Lyon*, **42** (6): 147–160.
- Viette, P.E.L.** 1975. Nouveaux Geometridae de Madagascar [Lepidopteral]. *Lambillionea* (Jubilee volume), **75**: 11–21.
- Viette, P.E.L.** 1980. Quelques nouvelles espèces madécasses de Lepidoptera Geometridae. *Bulletin de la Société entomologique de France*, **85**: 28–37.
- Viette, P.E.L.** 1981. Nouveaux Geometridae de Madagascar (Lepidoptera). *Alexanor*, **12**: 121–128.
- Viette, P.E.L.** 1990. Liste récapitulative des Lépidoptères Hétérocères de Madagascar. Supplément 1 à *Faune de Madagascar*, 263 pp. Privately published by the author.
- Viette, P.E.L.** 1991. Principales localités où des insectes ont été recueillis à Madagascar. Supplément 2 à *Faune de Madagascar*, 88 pp. Privately published by the author.
- Viette, P.E.L. and Fletcher, D.S.** 1968. The types of Lepidoptera Heterocera described by P. Mabille. *British Museum Bulletin (Natural History, Entomology series)*, **21** (8): 389–425.
- Vuattoux, R.** 1980. Les Lépidoptères Géométrides élevés à la station de Lamto (République de Côte d'Ivoire). *Annals of the University of Abidjan (Ecology series)*, **13**: 81–109.
- Walker, F.** 1860. *List of the Specimens of lepidopterous Insects in the Collection of the British Museum*, **20**: 1–276.
- Walker, F.** 1861. *List of the Specimens of lepidopterous Insects in the Collection of the British Museum*, **23**: 757–1020.
- Walker, F.** 1862. *List of the Specimens of lepidopterous Insects in the Collection of the British Museum*, **24**: 1021–1280.
- Walker, F.** [1863]. *List of the Specimens of lepidopterous Insects in the Collection of the British Museum*, **26**: 1479–1796.
- Walker, F.** 1866. *List of the Specimens of lepidopterous Insects in the Collection of the British Museum (Suppl.)*, **35** (5): 1535–2040.
- Wallengren, H.D.J.** 1872. Bidrag till Södra Afrikas Fjärilfauna. *Översigt af Konglingar Vetenskaps-Akademiens Förfärlingar*, **29** (3): 41–61.
- Wallengren, H.D.J.** 1875. Insecta Transvaaliensia. Bidrag till Transvaalska Republikens i Södra Afrika Insektafauna. *Översigt af Konglingar Vetenskaps-Akademiens Förfärlingar*, **32** (1): 83–137. Stockholm.
- Warnecke, G.** 1939. Über die Verbreitung der deutschen Arten der früheren Geometriden-Gattung *Fidonia* Hb., jetzt *Narraga* Wkr., *Isturgia* Hb. und *Bichromo* Gump. *Mitteilungen der Münchner entomologischen Gesellschaft*, **29**: 382–396 1 pl., 5 maps.
- Warren, W.** 1894. New Genera and Species of Geometridae. *Novitates zoologicae*, **1**: 366–466.
- Warren, W.** 1895. New Species and Genera of Geometridae in the Tring Museum. *Novitates zoologicae*, **2**: 82–159.
- Warren, W.** 1896. New Species of Drepanulidae, Thyrididae, Uraniidae, Epiplemidiae, and Geometridae in the Tring Museum. *Novitates zoologicae*, **3**: 335–419.
- Warren, W.** 1897a. New Genera and Species of Moths from the Old-World Regions in the Tring Museum. *Novitates zoologicae*, **4**: 12–130.
- Warren, W.** 1897b. New Genera and Species of Moths from the Old-World Regions. *Novitates zoologicae*, **4**: 378–402.
- Warren, W.** 1897c. New Genera and Species of Drepanulidae, Thyrididae, Epiplemidiae, Uraniidae, and Geometridae. *Novitates zoologicae*, **4**: 195–262.
- Warren, W.** 1898a. New Species and Genera of the Families Thyrididae, Uraniidae, Epiplemidiae, and Geometridae. *Novitates zoologicae*, **5**: 5–41.
- Warren, W.** 1898b. New Species and Genera of the Families Drepanulidae, Thyrididae, Uraniidae, Epiplemidiae, and Geometridae from the Old-World Regions. *Novitates zoologicae*, **5**: 221–258.
- Warren, W.** 1899a. New Species and Genera of the Families Drepanulidae, Thyrididae, Uraniidae, Epiplemidiae, and Geometridae from the Old-World Regions. *Novitates zoologicae*, **6**: 1–66.
- Warren, W.** 1899b. New Drepanulidae, Thyrididae, and Geometridae, from the Aethiopian region. *Novitates zoologicae*, **6**: 287–312.
- Warren, W.** 1900. New genera and species of Thyrididae and Geometridae from Africa. *Novitates zoologicae*, **7**: 90–97.
- Warren, W.** 1901. Drepanulidae, Thyrididae, Epiplemidiae, and Geometridae from the Aethiopian Region. *Novitates zoologicae*, **8**: 202–217.
- Warren, W.** 1902. New African Drepanulidae, Thyrididae, Epiplemidiae, and Geometridae. *Novitates zoologicae*, **9**: 487–536.
- Warren, W.** 1904. New Drepanulidae, Thyrididae, Uraniidae, and Geometridae from the Aethiopian Region. *Novitates zoologicae*, **11**: 461–482.
- Warren, W.** 1905a. New species of Geometridae from the Aethiopian Region. *Novitates zoologicae*, **12**: 34–40.
- Warren, W.** 1905b. New African Thyrididae, Uraniidae, and Geometridae. *Novitates Zoologicae*, **12**: 380–409.
- Warren, W.** 1905c. New Species of Thyrididae, Uraniidae, and Geometridae, from the Oriental Region. *Novitates zoologicae*, **12**: 410–438.
- Warren, W.** 1909. New Species of Uraniidae and Geometridae from the Aethiopian Region. *Novitates zoologicae*, **16**: 110–128.
- Warren, W.** 1911. Description of some new Geometridae and Pyralidae from South Africa. *Annals of the South African Museum*, **10**: 19–30.
- Warren, W.** 1914. Description of New Species of Lepidoptera Heterocera in the South African Museum. *Annals of the South African Museum*, **10**: 467–510, 2pl.

- Warren, W. and Rothschild, N.C.** 1905. Lepidoptera from the Sudan. *Novitates zoologicae*, **12**: 21–33.
- Wehrli, E.** 1937. Einige neue UnterGattungen, Arten und Unterarten. *Entomologische Zeitschrift*, Frankfurt am Main, **51**: 117–120.
- Wehrli, E.** 1940. Die Spanner des palaearktischen Faunengebietes. Supplement to volume 4. In: Seitz, A., *Die Gross-Schmetterlinge der Erde*. Alfred Kernen, Stuttgart.
- Wenger, M.J.A.** 1978 (ed.). *Biogeography and ecology of Southern Africa*. Vol. 1: 1–659; vol 2: 660–1439. Junk, The Hague.
- Whalley, P.** 1986. A review of current fossil evidence of Lepidoptera in the Mesozoic. *Biological Journal of the Linnean Society*, **28**: 253–271.
- Wiltshire, E.P.** 1936. Notes on the early stages of some Syrian Lepidoptera with the description of a new Ichneumon by Claude Morley. FRES, FZS, FGS, *Entomologists' Record*, **47** (7–8): 1–8, pl. 3.
- Wiltshire, E.P.** 1939. A third contribution to the knowledge of the early stages of oriental Lepidoptera. *Mitteilungen der Münchener Entomologischen Gesellschaft*, **39**: 4–12.
- Wiltshire, E.P.** 1949. The Lepidoptera of the Kingdom of Egypt, Part II. *Bulletin de la Société Fouad Ier d'Entomologie*, **33**: 427.
- Wiltshire, E.P.** 1952. Lepidoptera recently taken in Arabia. *Bulletin de la Société Fouad Ier d'Entomologie*, **36**: 135–174.
- Wiltshire, E.P.** 1962. Early stages of Old World Lepidoptera XII. *Journal of the Bombay Natural History Society*, **60**: 778–799.
- Wiltshire, E.P.** 1980. Insects of Saudi Arabia. Fam. Cossidae, Limacodidae, Sesiidae, Lasiocampidae, Sphingidae, Notodontidae, Geometridae, Lymantriidae, Nolidae, Arctiidae, Agaristidae, Noctuidae, Ctenuchidae (Pt. 2). *Fauna of Saudi Arabia*, **2**: 179–240.
- Wiltshire, E.P.** 1982. Insects of Saudi Arabia. Fam. Cossidae, Zygadenidae, Sesiidae, Lasiocampidae, Bombycidae, Sphingidae, Thaumetopoeidae, Thyretidae, Notodontidae, Geometridae, Lymantriidae, Noctuidae, Agaristidae, Noctuidae, Ctenuchidae (Pt. 2). *Fauna of Saudi Arabia*, **4**: 271–332.
- Wiltshire, E.P.** 1985. New Heterocera from Oman (with a revised list of the moths known from the Musandam Peninsula). *The Journal of Oman Studies*, **7**: 39–48, 6pl.
- Wiltshire, E.P.** 1986. Lepidoptera of Saudi Arabia. Fam. Cossidae, Sesiidae, Metarbelidae, Lasiocampidae, Sphingidae, Geometridae, Lymantriidae, Arctiidae, Nolidae, Noctuidae (Heterocera); Fam. Satyridae (Rhopalocera) (Pt. 5). *Fauna of Saudi Arabia*, **8**: 262–323.
- Wiltshire, E.P.** 1990. An illustrated, annotated catalogue of the Macro-Heterocera of Saudi Arabia. Reprint from: *Fauna of Saudi Arabia*, **11**: 91–250.
- Wing, S.L. and Suess, H.-D.** 1992. Mesozoic and Early Cenozoic Terrestrial Ecosystems. Chapter 6 (Pp. 326–416) in: Behrensmeyer, A.K. et alii, *Terrestrial Ecosystems through Time*. The University of Chicago Press. 568 pp.
- Zerny, H.** 1934. Neue Heteroceren aus dem Grossen Atlas in Marokko. *Zeitschrift des österreichischen entomologischen Vereins*, **19**: 33–39, 43–48, 52–53 1 pl.
- Zerny, H.** 1936. Die Lepidopterenfauna des Grossen Atlas in Marokko und seiner Randgebiete. *Mémoires de la Société des sciences naturelles du Maroc*, **42**: 163 pp. [Issued 31st December 1935.]



Figs 1a-f. Eggs of Macariini. Scale bar = 0.2 mm. 1a, *Acanthovalva inconspicuaria* (top left); 1b, *Chiasmia u. umbrata* (top right); 1c, *C. s. subcurvaria* (centre left); 1d, *C. s. subcurvaria* (centre right); 1e, *C. furcata* (bottom left); 1f, *C. trizonaria* (bottom right).



Figs 2–3. Larvae. 2, *Isturgia deerraria*; 3, *Chiasmia s. simplicilinea*.

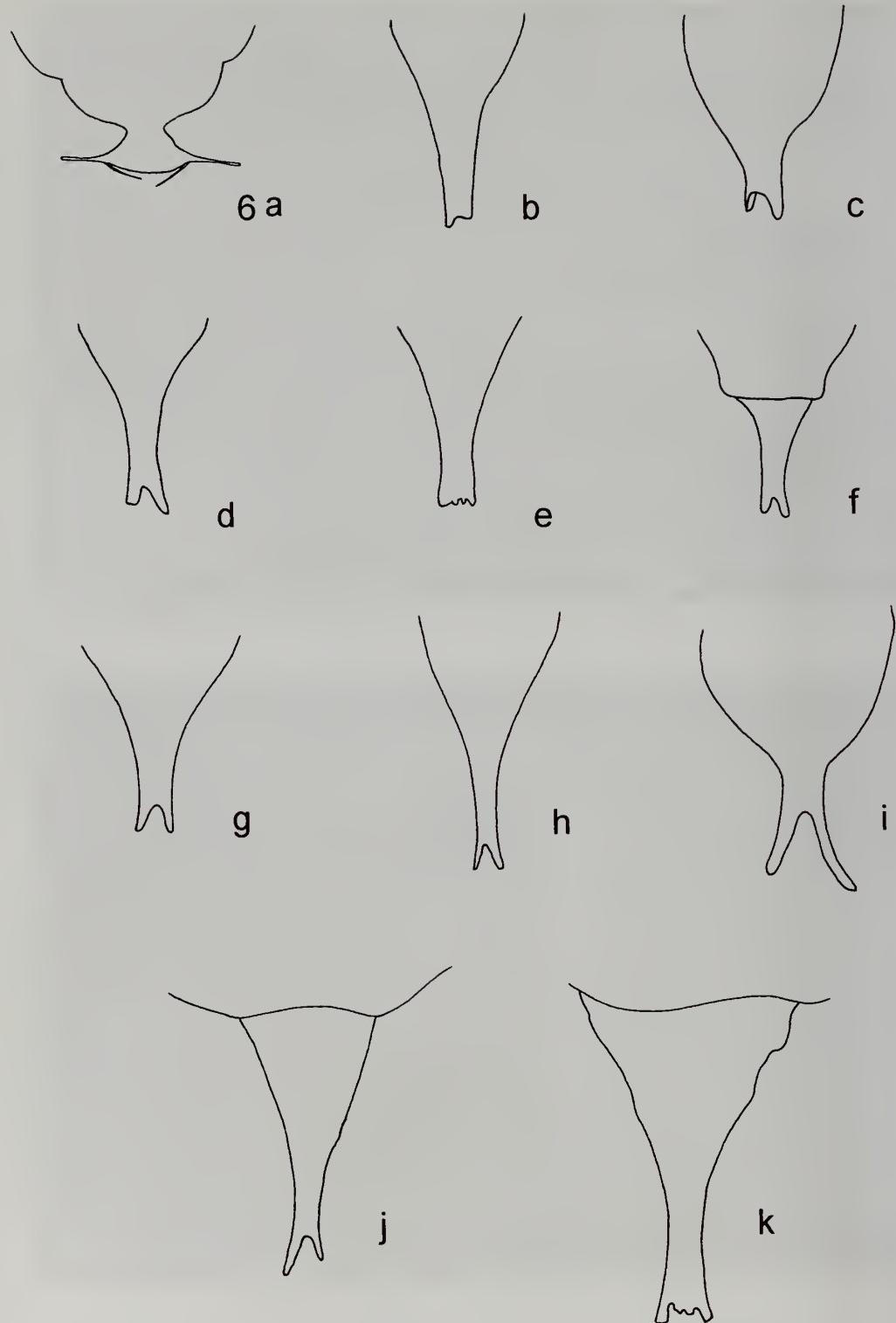


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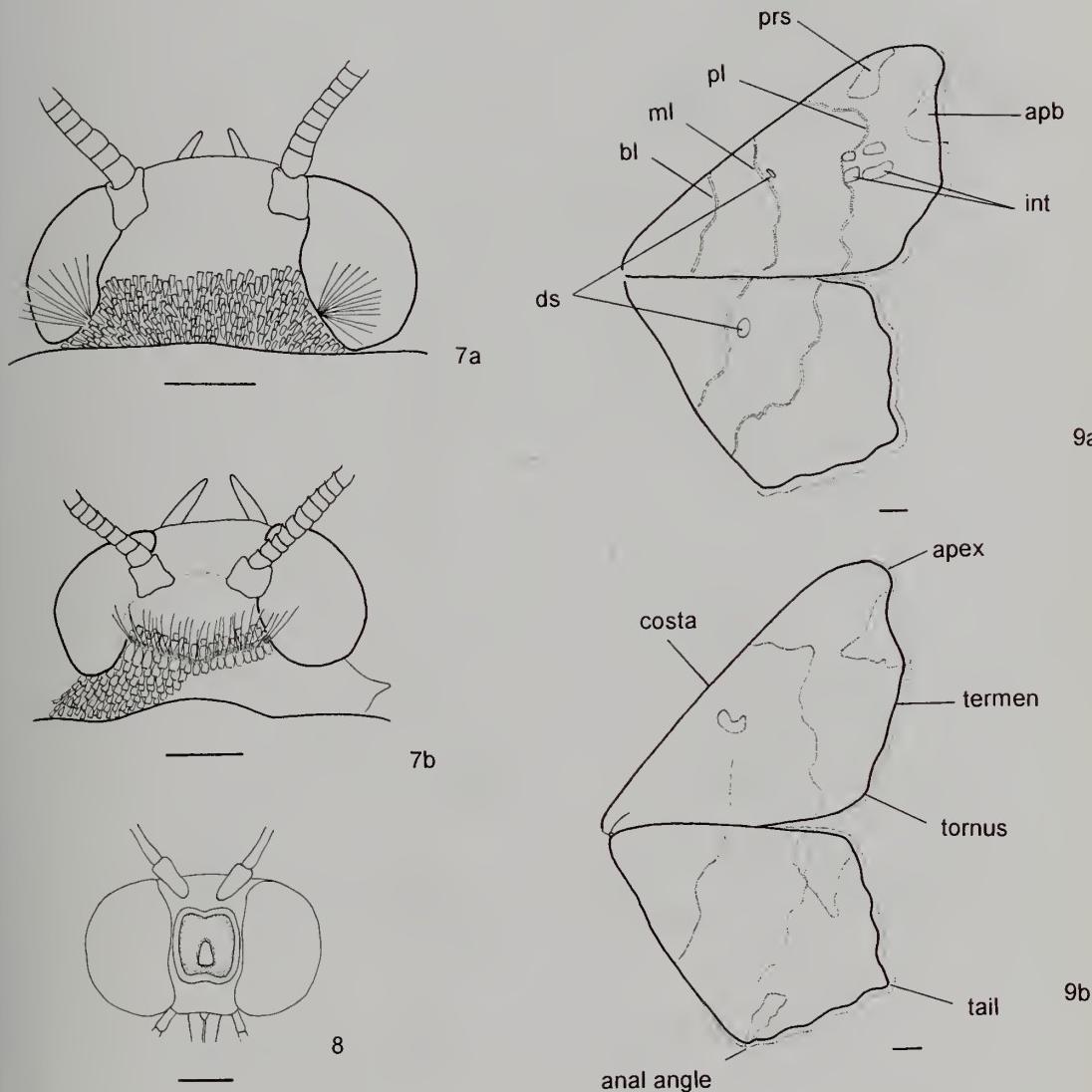


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Figs 4-5. Larvae. 4, *C. b. brongusaria*; 5, *C. s. streniata*.



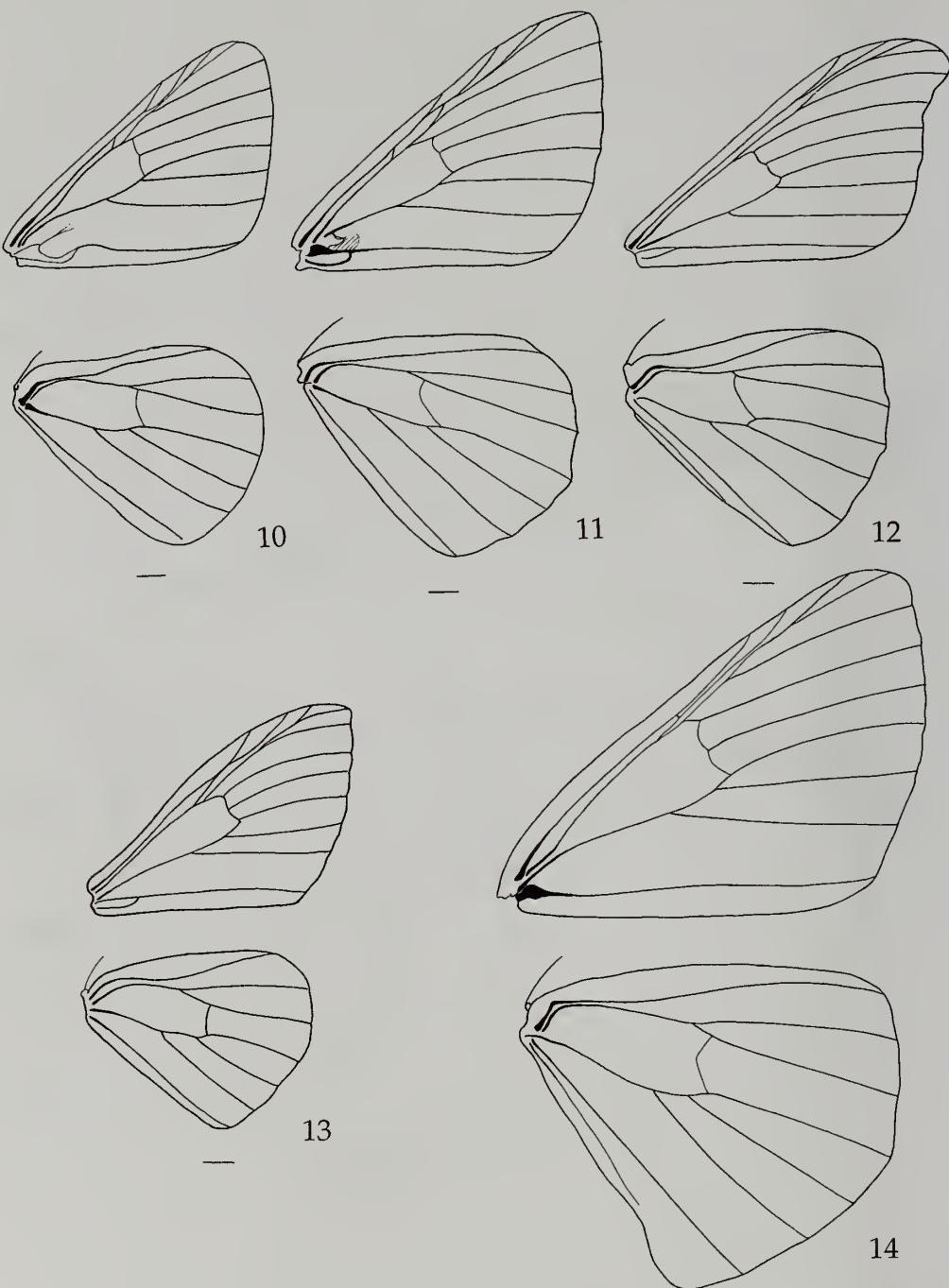
Figs 6a-j. Pupa, cremaster shape. a, *Platypepla macilenta*; b, *Isturgia deerraria*; c, *I. spissata*; d, *Chiasmia furcata*; e, *C. s. subcurvaria*; f, *C. turbulentata*; g, *C. trizonaria*; h, *C. interrupta*; i, *C. s. simplicilinea*; j, *Chiasmia s. strenuata*; k, *Chiasmia* sp. Scale bar = 0.1 mm.



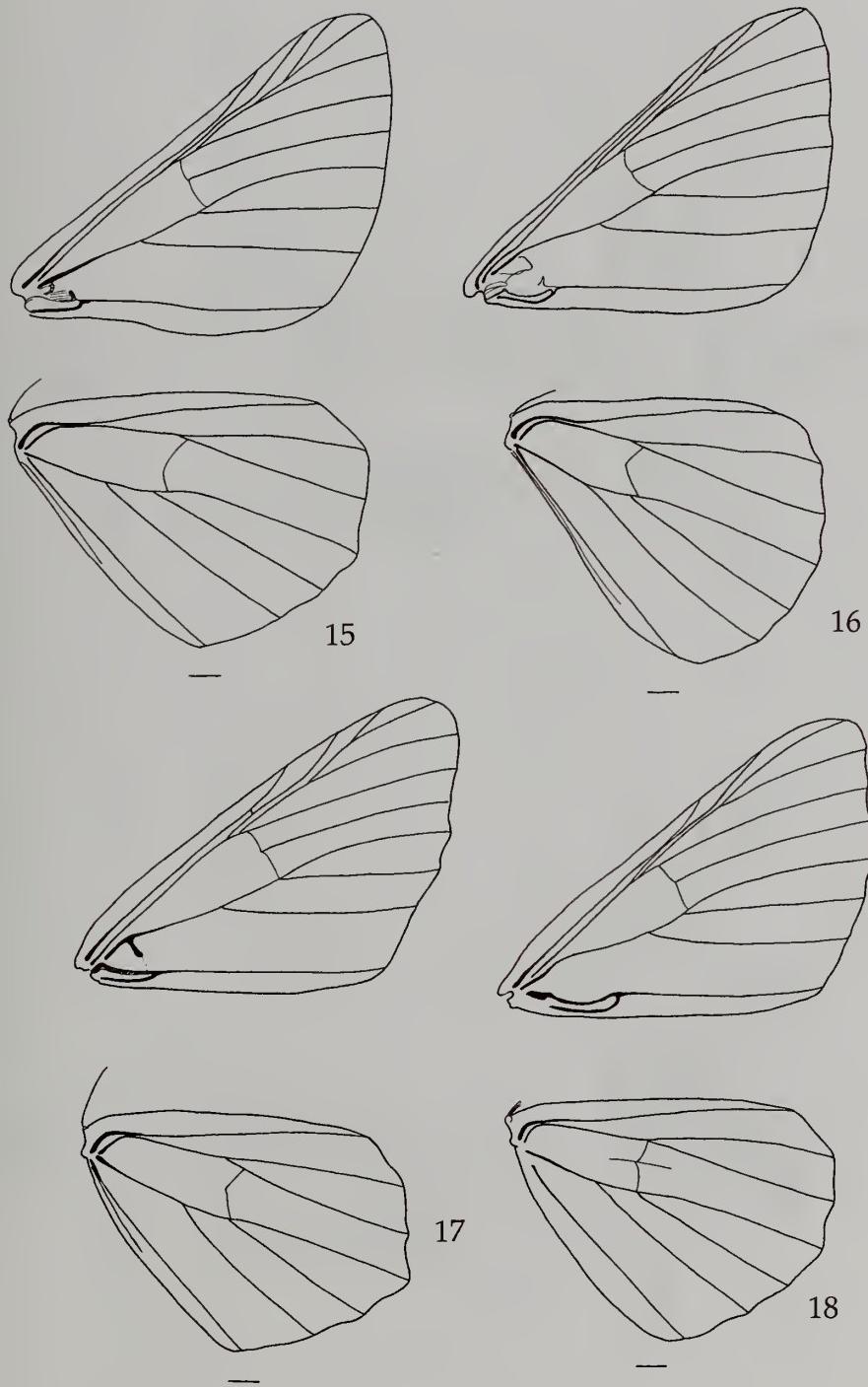
**Fig. 7.** Adult. Dorsal aspect of head, showing normal (a) and transversely elongated condition of chaetosemata (b). Scaling partly omitted. Scale bar = 0.5 mm.

**Fig. 8.** Adult. Frontal aspect of head of *Chiasmia nubilata*, showing horseshoe-shaped prominence. Scale bar = 0.5 mm.

**Fig. 9.** Adult. Elements of wing pattern in *Chiasmia natalensis*. a, upperside; b, underside. Abbreviations: apb = apical blotch; bl = basal line; ds = discal spots; int = interneural spots; ml = median line; pl = postmedian line; prs = preapical spot. Scale bar = 1 mm.



Figs 10–14. Wing venation. 10, *Acanthovalva inconspicuaria*; 11, *Plateoplia acrobelia*; 12, *Milocera dubia* (after Janse, 1932); 13, *Platypepla spurcata*; 14, *Chelotephrina acorema*. Scale bar = 1 mm.



Figs 15–18. Wing venation. 15, *Tephritis murinaria*; 16, *Isturgia deerraria*; 17, *Macaria liturata*; 18, *Chiasmia furcata*.  
Scale bar = 1 mm.

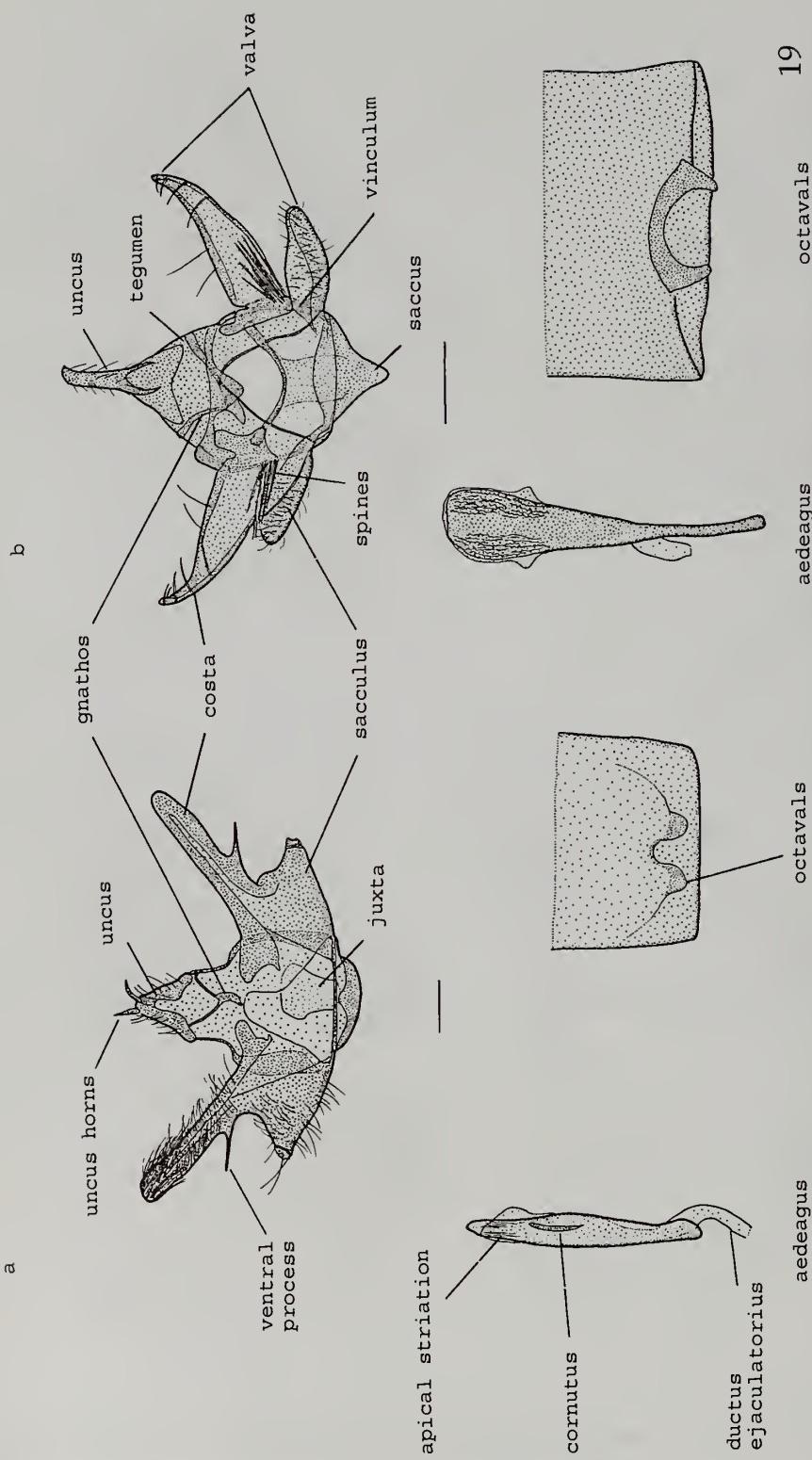


Fig. 19. Male genitalia and octavals of higher Macarini (a) and *Platypepla* group of genera (b). Scale bar = 0.3 mm.

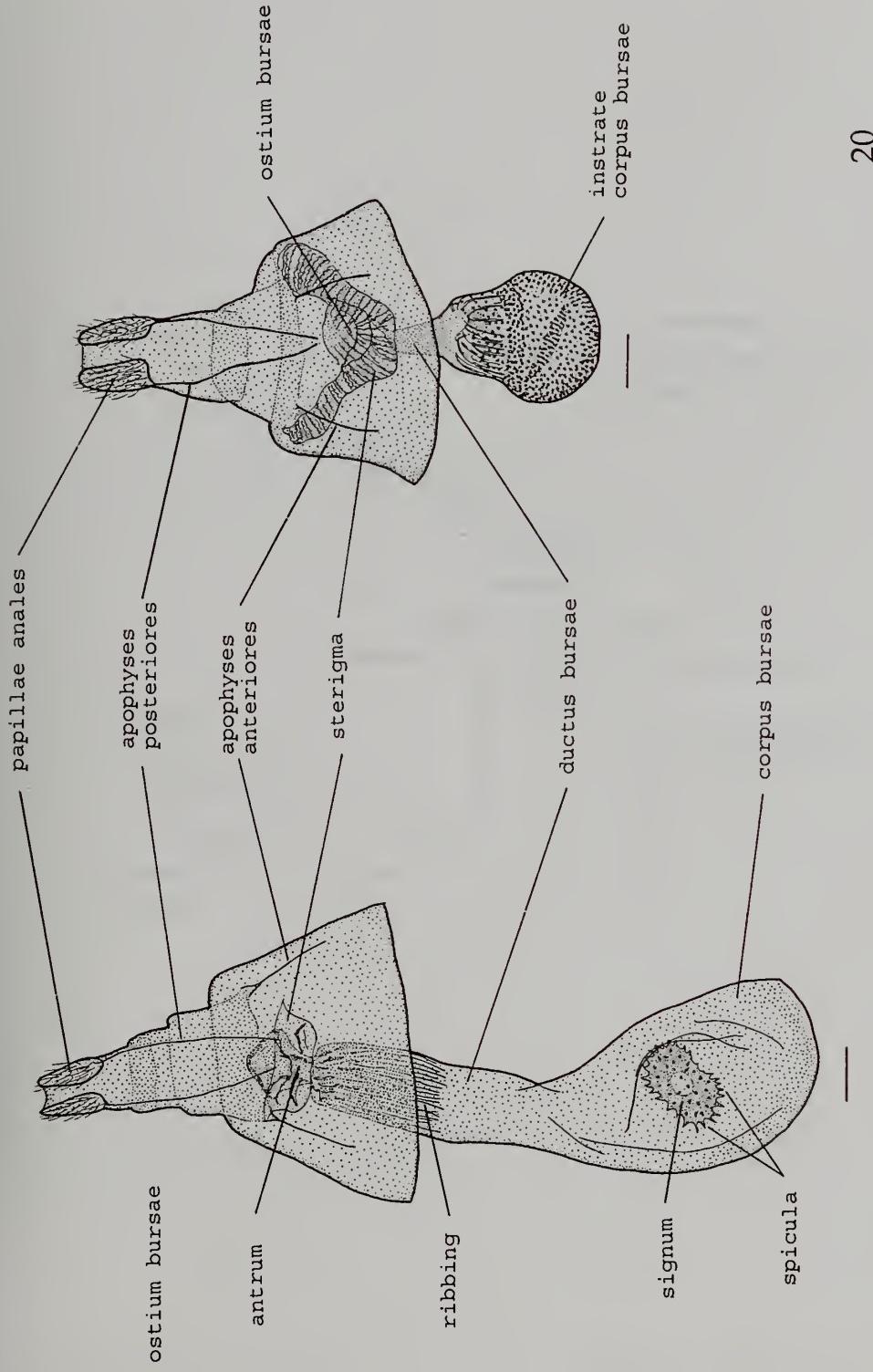


Fig. 20. Female genitalia of higher Macariini (a) and *Platyneppla* group of genera (b). Scale bar = 0.3 mm.

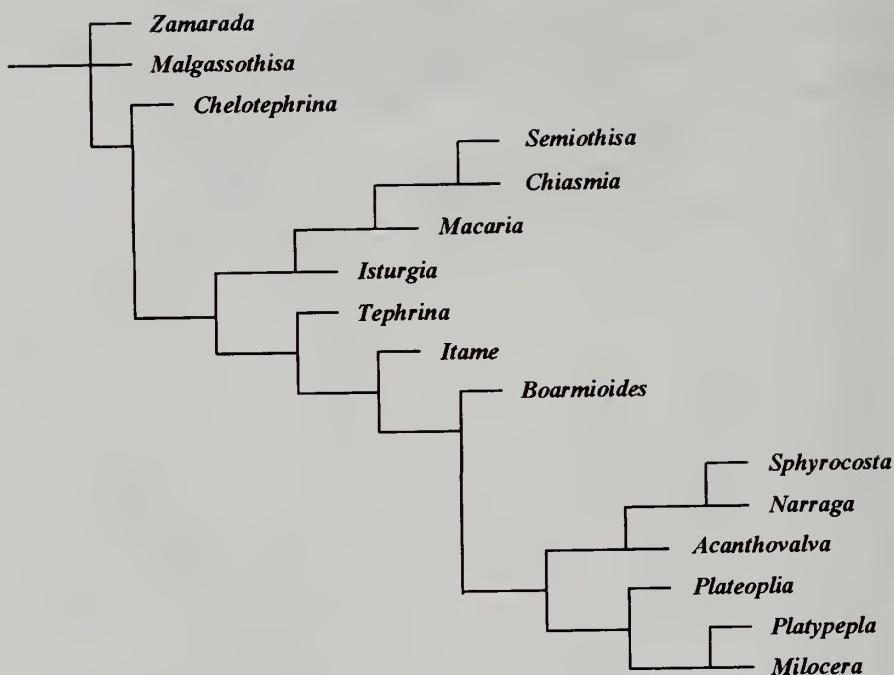
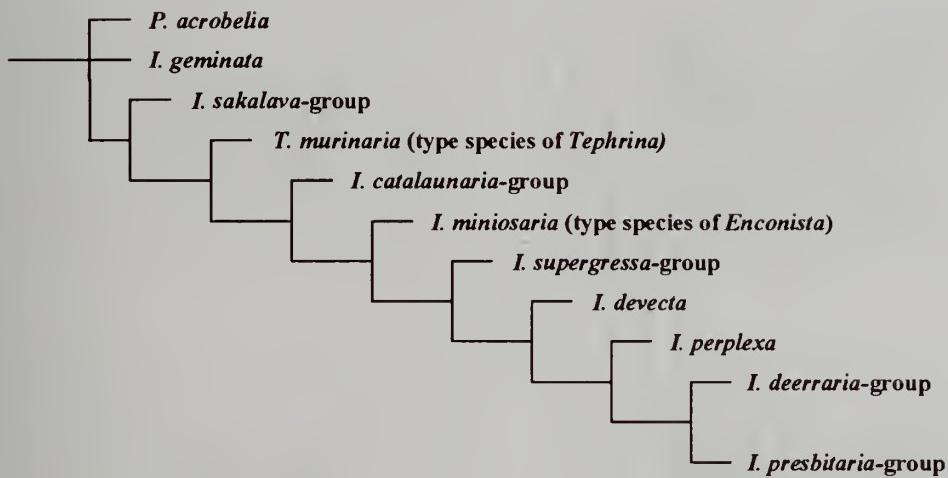


Fig. 21. Cladogram of selected macariine genera.

Fig. 22. Cladogram of *Isturgia* species-groups.

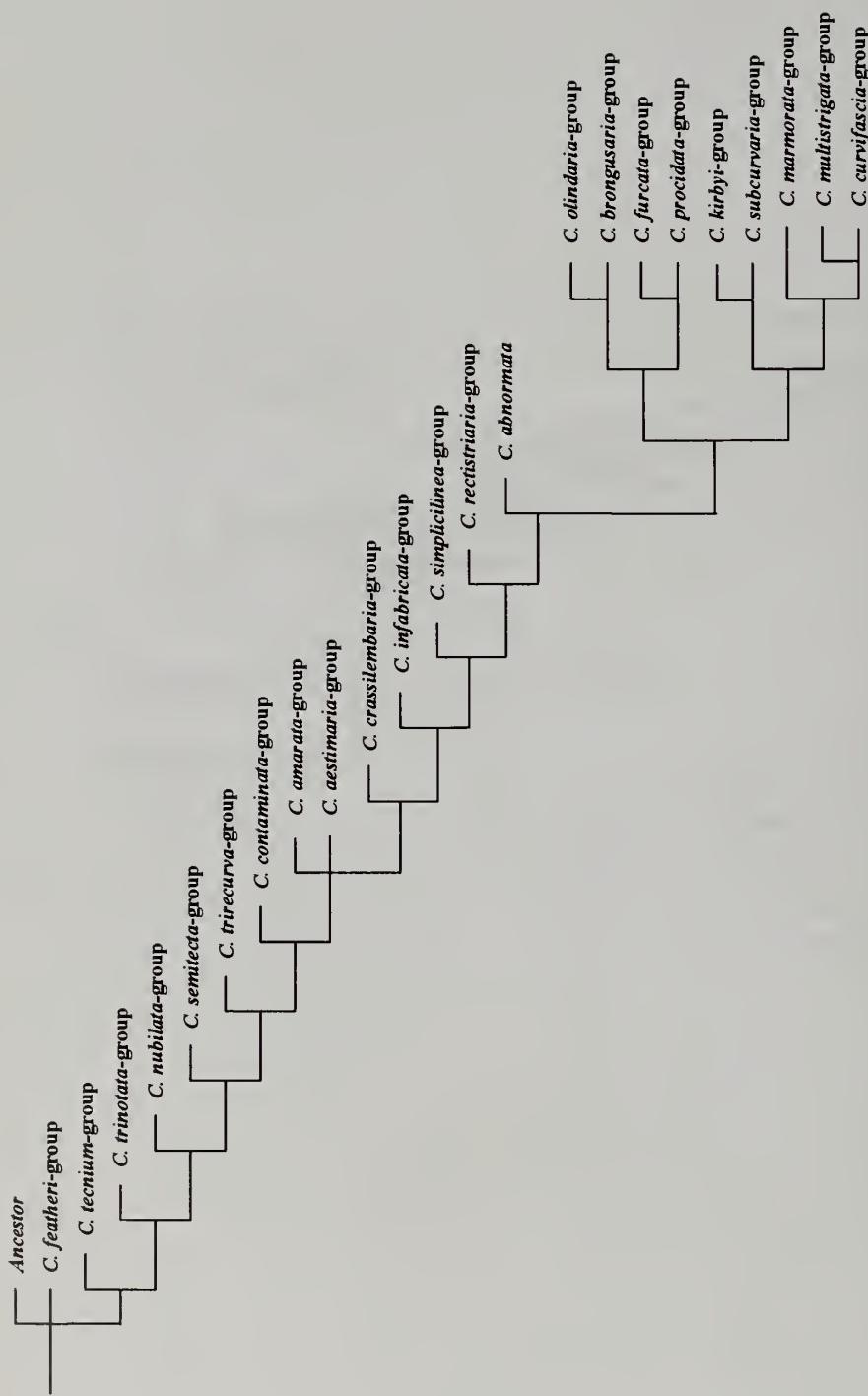


Fig. 23. Cladogram of *Chiasmia* species-groups.



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Figs 24–31. Adults. 24, 25, *Acanthovalva inconspicuaria* (Hübner); 26, *A. magna* sp. n.; 27, *A. capensis* sp. n.; 28, *A. itremo* sp. n.; 29, 30, *A. bilineata* (Warren); 31, *A. focularia* (Geyer). Scale-bar = 5 mm.



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Figs 32–39. Adults. 32, 33, *Narraga n. nelvae* (Rothschild); 34, *P. acrobelia* (Wallengren); 35, 36, *Sphyrocosta madecassa* (Vieite); 37, *Milocera horaria* Swinhoe; 38, *M. eugompha* sp. n.; 39, *M. podocarpi* Prout. Scale-bar = 5 mm.



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Figs 40–47. Adults. 40, *Milocera depauperata* sp. n.; 41, *M. sexcornuta* sp. n.; 42, *M. herbuloti* sp. n.; 43, *M. pyrinia* Prout; 44, *M. ustatoides* sp. n.; 45, 46, *M. diffusata* (Warren); 47, *M. zika* sp. n. Scale-bar = 5 mm.



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Figs 48–55. Adults. 48, 49, *Milocera ja* sp. n.; 50, *M. scoblei* sp. n.; 51, *M. aurora* sp. n.; 52, *M. obfuscata* sp. n.; 53, *M. ustata* Herbulot; 54, *M. umbrosa* Herbulot; 55, *M. arcifera* (Prout). Scale-bar = 5 mm.



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Figs 56–63. Adults. 56, *Milocera arcifera* (Prout); 57, *M. pelops* sp. n.; 58, *M. divorsa* Prout; 59, *M. thyestes* sp. n.; 60, *M. hypamymcha* sp. n.; 61, *M. dubia* (Prout); 62, *M. aureolitoralis* sp. n.; 63, *M. atreus* sp. n.. Scale-bar = 5 mm.



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Figs 64–71. Adults. 64, *Milocera tantalus* sp. n.; 65, 66, *Platypepla spurcata* (Warren); 67, *P. jordani* sp. n.; 68, *P. uhlenhuthi* sp. n.; 69, 70, *P. macilenta* sp. n.; 71, *P. griseobrunnea* sp. n. Scale-bar = 5 mm.



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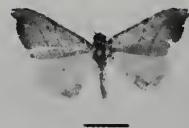


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Figs 72-79. Adults. 72, *Platypepla loranthiphaga* sp. n.; 73, 74, *P. flava* sp. n.; 75, 76, *P. persubtilis* sp. n.; 77, *P. bullifera* sp. n.; 78, *P. pseudospurcata* sp. n.; 79, *P. mackayi* sp. n. Scale-bar = 5 mm.



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Figs 80–87. Adults. 80, *Platypepla schistopenis* sp. n.; 81, *P. curvigliadiata* sp. n.; 82, *Chelotephrina crypsispila* (Fletcher); 83, 84, *C. acorema* sp. n.; 85, 86, *Tephritis murinaria* ([D. & S.]); 87, *Isturgia catalaunaria* (Guenée). Scale-bar = 5 mm.



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Figs 88-95. Adults. 88, *Isturgia catalaunaria* (Guenée); 89, *I. triseriata* (Prout); 90, 91, *I. univirgaria* (Mabille); 92, 93, *I. dukuduku* sp. n.; 94, *I. sakalava* (Herbulot); 95, *I. miniosaria duponcheli* (Prout). Scale-bar = 5 mm.



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Figs 96–103. Adults. 96, 97, *Isturgia hausmanni* sp. n.; 98, 99, *I. terminipuncta* sp. n.; 100–102, *I. supergressa* (Prout); 103, *I. prionogyna* (Prout). Scale-bar = 5 mm.



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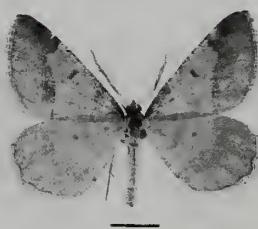
Figs 104–111. Adults. 104, 105, *Isturgia exospilata* (Walker); 106, 107, *I. contexta* (Saalmüller); 108, *I. modestaria* (Pagenstecher); 109, 110, *I. averyi* (Viette); 111, *I. comorensis* sp. n. Scale-bar = 5 mm.



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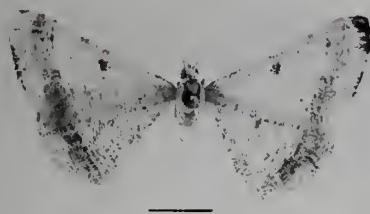


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Figs 112–119. Adults. 112, *Isturgia comorensis* sp. n.; 113, *I. berytaria* (Staudinger); 114, *I. spodiaria mizanensis* (Wehrli); 115, 116, *I. exustaria* (Staudinger); 117, 118, *I. rubrior* (Hausmann); 119, *I. disputaria* (Guenée). Scale-bar = 5 mm.



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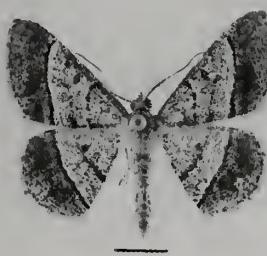
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Figs 120–127. Adults. 120, *Isturgia disputaria* (Guenée); 121, 122, *I. netta* (Holland); 123, 124, *I. exerraria* (Prout); 125–127, *I. deerraria* (Walker). Scale-bar = 5 mm.



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Figs 128–135. Adults. 128, *Isturgia deerraria* (Walker); 129, 130, *I. pygmaeata* sp. n.; 131, *I. griveaudi* sp. n.; 132, 133, *I. pervaria* (Lederer); 134, 135, *I. sublimbata* (Butler). Scale-bar = 5 mm.



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Figs 136–143. Adults. 136, 137, *Isturgia arizela* (Fletcher); 138, 139, *I. quadriplaga* (Rothschild); 140, *I. inaequivirgaria* (Mabille); 141–143, *I. philbyi* (Wiltshire). Scale-bar = 5 mm.



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Figs 144–151. Adults. 144–146, *Isturgia spissata* (Walker); 147–149, *I. arizeloides* sp. n.; 150, 151, *I. albogrisea* sp. n.  
Scale-bar = 5 mm.



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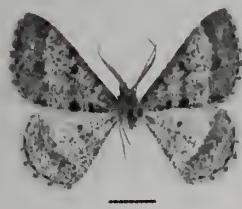
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Figs 152-159. Adults. 152, 153, *Isturgia megasaccus* sp. n.; 154, 155, *I. presbitaria* (Swinhoe); 156, *I. virescens* sp. n.; 157, *I. kiellandi* sp. n.; 158, *I. devecta* (Herbulot); 159, *I. famula brunnea* (Le Cerf). Scale-bar = 5 mm.



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Figs 160–167. Adults. 160, *Isturgia geminata* (Warren); 161, *I. perplexa* sp. n.; 162, 163, *Itame vincularia* (Hübner); 164, 165, *Boarmioides colpias* (Prout); 166, *Macaria wauaria africana* (Zerny); 167, *Chiasmia calvifrons* (Prout). Scale-bar = 5 mm.



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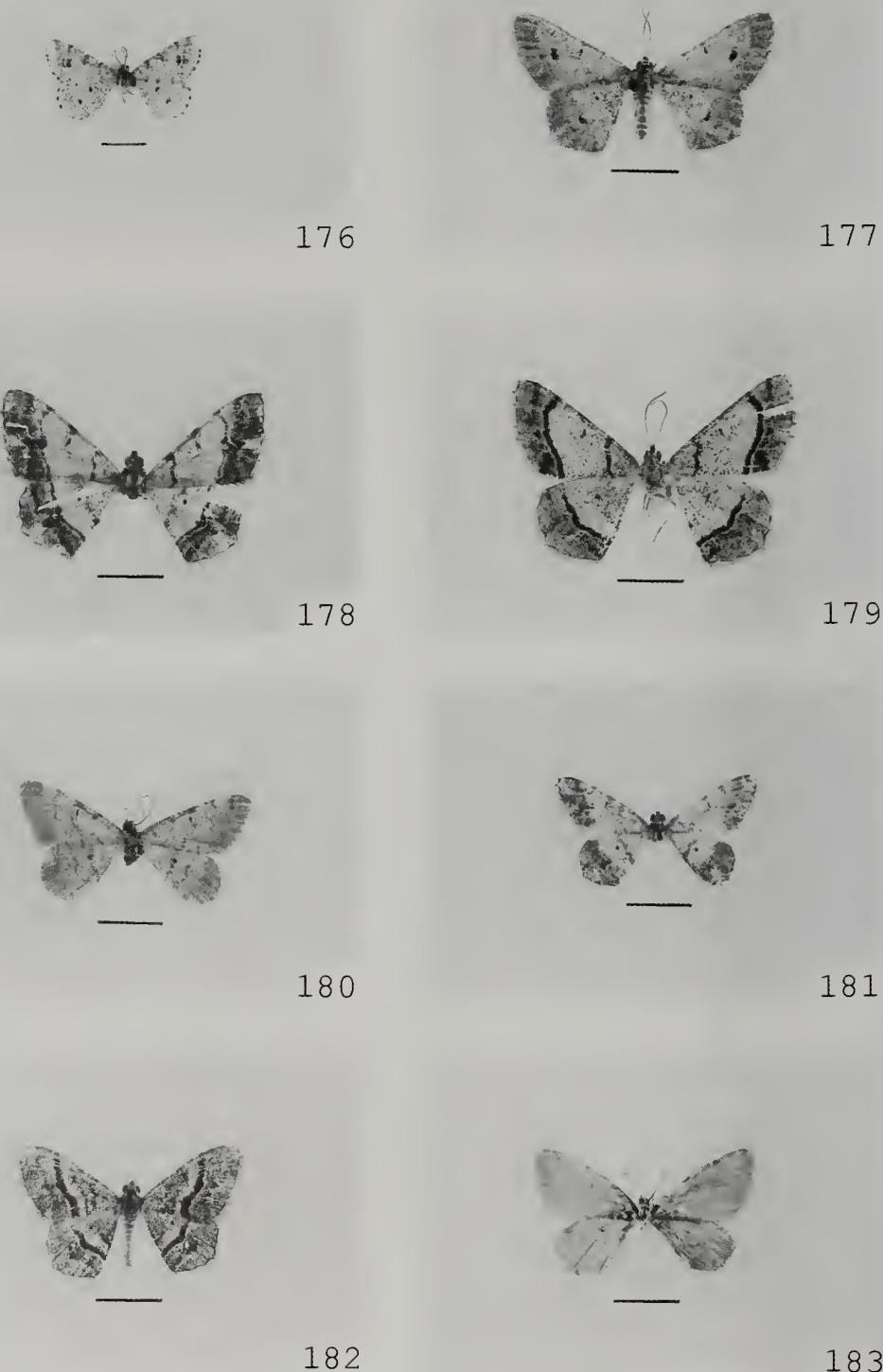


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Figs 168–175. Adults. 168, *Chiasmia calvifrons* (Prout); 169, 170, *C. puerilis* (Prout); 171, *C. featheri* (Prout); 172–174, *C. zelota* (Prout); 175, *C. ate* (Prout). Scale-bar = 5 mm.



Figs 176–183. Adults. 176, *Chiasmia dodoma* sp. n.; 177–179, *C. tecnum* (Prout); 180, *C. monopepla* (Prout); 181, *C. frontosa* (Wiltshire); 182, *C. banian* (Viette); 183, *C. trinotata* (Warren). Scale-bar = 5 mm.



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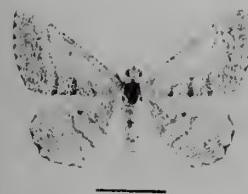
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Figs 184–191. Adults. 184, 185, *Chiasmia trinotatula* sp. n.; 186–188, *C. diarmodia* (Prout); 189, *C. ngami* sp. n.; 190, *C. nubilata* (Warren); 191, *C. extrusilinea* (Warren). Scale-bar = 5 mm.



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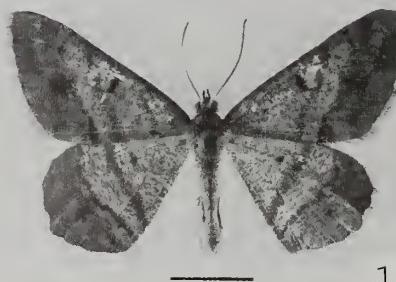
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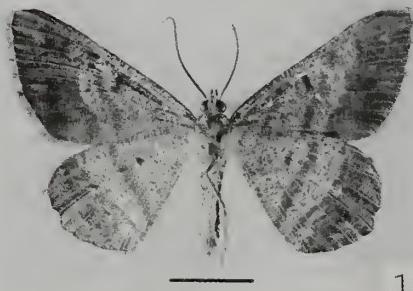
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Figs 192–199. Adults. 192, *Chiasmia somalica* sp. n.; 193–195, *C. semitecta* (Walker); 196, 197, *C. brunnescens* sp. n.; 198, 199, *C. grisescens* (Prout). Scale-bar = 5 mm.



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Figs 200–207. Adults. 200, 201, *Chiasmia murina* sp. n.; 202, 203, *C. hunyani* sp. n.; 204, 205, *C. melsetter* sp. n.; 206, *C. bomfordi* sp. n.; 207, *C. pinheyi* sp. n. Scale-bar = 5 mm.



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Figs 208–215. Adults. 208, *Chiasmia pinheyi* sp. n.; 209, *C. deleta* sp. n.; 210, *C. alternata* (Warren); 211–213, *C. orthostates* (Prout); 214, *C. iringa* sp. n.; 215, *C. johnstoni* (Butler). Scale-bar = 5 mm.



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Figs 216–223. Adults. 216, *Chiasmia johnstoni* (Butler); 217, *C. semicolor* (Warren); 218–220, *C. rhabdophora* (Holland); 221, 222, *C. nobilitata* (Prout); 223, *C. infabricata* (Prout). Scale-bar = 5 mm.



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Figs 224–231. Adults. 224, 225, *Chiasmia infabricata* (Prout); 226, *C. adelpha* sp. n.; 227, *C. nevilledukei* sp. n.; 228, *C. trirecurva* (Saalmüller); 229–231, *C. confuscata* (Warren). Scale-bar = 5 mm.



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Figs 232–239. Adults. 232, *Chiasmia sororcula* (Warren); 233, 234, *C. fuscataria* (Möschler); 235, 236, *C. malgassofusca* sp. n.; 237, 238, *C. flavicuneata* (Herbulot); 239, *C. s. separata* (Warren). Scale-bar = 5 mm.



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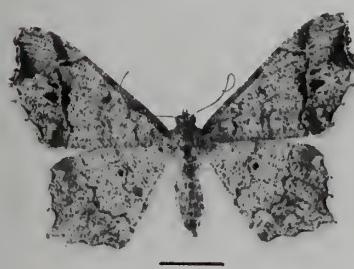
Figs 240–247. Adults. 240, 241, *Chiasmia s. separata* (Warren); 242–244, *C. livorosa* (Herbulot); 245, *C. neolivorosa* sp. n.; 246, *C. parallacta* (Warren); 247, *C. paucimacula* sp. n. Scale-bar = 5 mm.



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Figs 248–255. Adults. 248, 249, *Chiasmia phaeostigma* (Fletcher); 250, 251, *C. natalensis* (Warren); 252, *C. coronoleucas* (Herbulot); 253, 254, *C. fontainei* (Fletcher); 255, *C. threnopis* (Fletcher). Scale-bar = 5 mm.



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Figs 256–263. Adults. 256, 257, *Chiasmia threnopsis* (Fletcher); 258, 259, *C. crumenata* (Fletcher); 260–262, *C. conturbata* (Warren); 263, *C. inquinata* sp. n. Scale-bar = 5 mm.



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Figs 264–271. Adults. 264, 265, *Chiasmia inquinata* sp. n.; 266–268, *C. insulicola* sp. n.; 269–271, *C. feraliata* (Guenée).

Scale-bar = 5 mm.



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Figs 272–279. Adults. 272–274, *Chiasmia a. amarata* (Guenée); 275, *C. a. choica* (Prout); 276, 277, *C. acutiapex* sp. n.; 278, *C. evansi* sp. n.; 279, *C. kilifi* sp. n. Scale-bar = 5 mm.



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Figs 280–287. Adults. 280, 281, *Chiasmia simplex* sp. n.; 282, *C. cararia* (Swinhoe); 283–285, *C. deceptrix* sp. n.; 286, 287, *C. duplicitinea* (Warren). Scale-bar = 5 mm.



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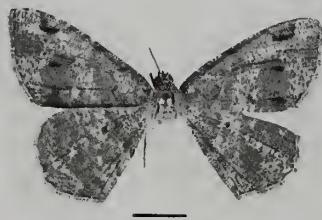
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Figs 288–295. Adults. 288, *Chiasmia duplicitinea* (Warren); 289, 290, *C. megalesia* (Viette); 291–293, *C. unigeminata* (Prout); 294, 295, *C. costiguttata* (Warren). Scale-bar = 5 mm.



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Figs 296–303. Adults. 296, *Chiasmia costiguttata* (Warren); 297–299, *C. kenyae* sp. n.; 300–302, *C. orientalis* sp. n.; 303, *C. trigonoleuca* (Herbulot). Scale-bar = 5 mm.



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Figs 304–311. Adults. 304, *Chiasmia plutocryspsis* (Herbulot); 305, 306, *C. angolae* (Bethune-Baker); 307, 308, *C. subcretata* (Warren); 309, 310, *C. geminilinea* (Prout); 311, *C. abyssinica* sp. n. Scale-bar = 5 mm.



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Figs 312–319. Adults. 312, 313, *Chiasmia subvaria* (Bastelberger); 314, *C. aestimaria* (Hübner); 315, *C. sareptanaria* (Staudinger); 316, 317, *C. syriacaria* (Staudinger); 318, *C. tenuiata* (Staudinger); 319, *C. s. streniata* (Guenée). Scale-bar = 5 mm.



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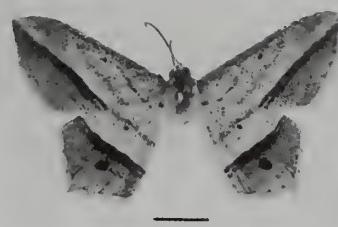


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Figs 320–327. Adults. 320–322, *Chiasmia s. steniata* (Guenée); 323, 324, *C. herbuloti* (Viette); 325, 326, *C. hypactinia* (Prout); 327, *C. tsaratanana* (Viette). Scale-bar = 5 mm.



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Figs 328–335. Adults. 328, *Chiasmia tsaratanana* (Vieite); 329, 330, *C. tetragraphicata* (Saalmüller); 331, 332, *C. angolaria* (Snellen); 333–335, *C. parastreniata* sp. n. Scale-bar = 5 mm.



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Figs 336–343. Adults. 336, *Chiasmia parastreniata* sp. n.; 337, 338, *C. buettikeri* (Wiltshire); 339, 340, *C. collaxata* (Herbulot); 341–343, *C. ostentosaria* (Möschler). Scale-bar = 5 mm.



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Figs 344–351. Adults. 344–346, *Chiasmia impar* (Warren); 347, 348, *C. grandis* sp. n.; 349–351, *C. pernoptera* (Prout).  
Scale-bar = 5 mm.



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Figs 352–359. Adults. 352, 353, *Chiasmia albivia* (Prout); 354, 355, *C. fitzgeraldi* (Carcasson); 356, *C. crassilembaria* (Mabille); 357, *C. peremarginata* sp. n.; 358, 359, *C. u. umbrata* (Warren). Scale-bar = 5 mm.



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Figs 360–367. Adults. 360, *Chiasmia u. umbrata* (Warren); 361–363, *C. maronga* sp. n.; 364, 365, *C. aureobrunnea* sp. n.; 366, 367, *C. i. inouei* (Herbulot). Scale-bar = 5 mm.



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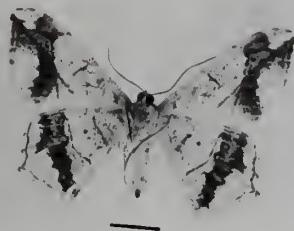


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Figs 368–375. Adults. 368, 369, *Chiasmia contaminata* (Warren); 370, *C. lindemannae* (Fletcher); 371, 372, *C. curvilineata* (Warren); 373, 374, *C. austera* (Swinhoe); 375, *C. s. simplicilinea* (Warren). Scale-bar = 5 mm.



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Figs 376–383. Adults. 376–378, *Chiasmia s. simplicilinea* (Warren); 379, 380, *C. affinis* (Warren); 381, 382, *C. fulvisparsa* (Warren); 383, *C. fulvimargo* (Warren). Scale-bar = 5 mm.



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Figs 384–391. Adults. 384, *Chiasmia fulvimargo* (Warren); 385–387, *C. kilimanjarensis* (Holland); 388–390, *C. rectistriaria* (Herrich-Schäffer); 391, *C. m. majestica* (Warren). Scale-bar = 5 mm.



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Figs 392–399. Adults. 392, 393, *Chiasmia majestica tropica* (Prout); 394, 395, *C. avitusarioides* (Herbulot); 396, 397, *C. m. multistrigata* (Warren); 398, *C. m. liliput* subsp. n.; 399, *Chiasmia improcera* (Herbulot). Scale-bar = 5 mm.



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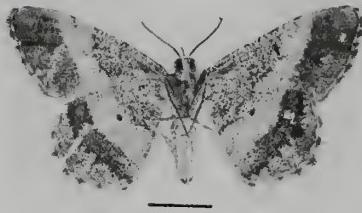
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Figs 400–407. Adults. 400, *Chiasmia improcera* (Herbulot); 401, 402, *C. zobrysi* sp. n.; 403, 404, *C. curvifascia* (Warren); 405–407, *C. boarmioides* sp. n. Scale-bar = 5 mm.



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Figs 408–415. Adults. 408, *Chiasmia unifilata* (Warren); 409, 410, *C. turbulentata* (Guenée); 411–413, *C. procidata semispurcata* (Walker); 414, 415, *C. latimarginaria* (Rebel). Scale-bar = 5 mm.



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Figs 416–423. Adults. 416, *Chiasmia latimarginaria* (Rebel); 417, 418, *C. warreni* (Prout); 419, 420, *C. pervittata* (Hampson); 421–423, *C. furcata* (Warren). Scale-bar = 5 mm.



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Figs 424–431. Adults. 424, *Chiasmia furcata* (Warren); 425, *C. i. inaequilinea* (Warren); 426, *C. butaria* (Swinhoe); 427, *C. grimmia* (Wallengren); 428, *C. observata* (Walker); 429, *C. s. subcurvaria* (Mabille); 430, 431, *C. kirbyi* (Wallengren). Scale-bar = 5 mm.



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Figs 432–439. Adults. 432, *Chiasmia vau* (Prout); 433, 434, *C. morogoro* sp. n.; 435, 436, *C. crassata* (Warren); 437, *C. semiolivacea* sp. n.; 438, 439, *C. punctilinea* (Prout). Scale bar = 5 mm.



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Figs 440–447. Adults. 440, 441, *Chiasmia dentilineata* (Warren); 442, *C. costicommata* (Prout); 443–447, *C. b. bringusaria* (Walker). Scale-bar = 5 mm.



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Figs 448–455. Adults. 448, 449, *Chiasmia b. exosciodes* (Prout); 450, *C. imitatrix* sp. n.; 451, *C. sudanata* (Warren & Rothschild); 452, *C. senegambiensis* sp. n.; 453, *C. tristis* sp. n.; 454, 455, *C. castanea* sp. n. Scale-bar = 5 mm.



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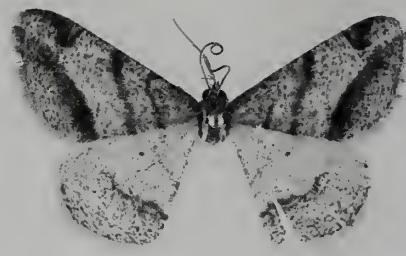


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Figs 456-463. Adults. 456, *Chiasmia castanea* sp. n.; 457, *C. i. inconspicua* (Warren); 458, *C. androphoba* sp. n.; 459-461, *C. assimilis* (Warren); 462, 463, *C. maculosa* (Warren). Scale-bar = 5 mm.



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Figs 464–471. Adults. 464, *Chiasmia ammodes* (Prout); 465, *C. olindaria* (Swinhoe); 466, *C. suriens* (Strand); 467, *C. danmariae* sp. n.; 468, *C. sangueresara* sp. n.; 469, *C. soror* sp. n.; 470, 471, *C. trizonaria* (Prout). Scale-bar = 5 mm.



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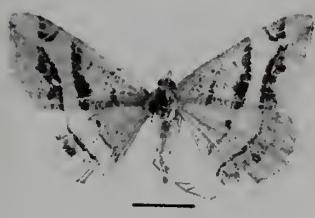
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Figs 472–479. Adults. 472, *Chiasmia clathrata azrouensis* Wehrli; 473–475, *C. umbratilis* (Butler); 476–478, *C. marmorata* (Warren); 479, *C. semialbida* (Prout). Scale-bar = 5 mm.



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Figs 480–487. Adults. 480, *C. obliquilineata* (Warren); 481, *C. interrupta* (Warren); 482, *C. abnormata* (Prout); 483, *C. anguifera* (Prout); 484–486, *C. arenosa* (Butler); 487, *C. getula* (Wallengren). Scale-bar = 5 mm.



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Figs 488-495. Adults. 488-490, *C. getula* (Wallengren); 491-494, *C. gyliura* (Prout); 495, *C. nana* (Warren). Scale-bar = 5 mm.



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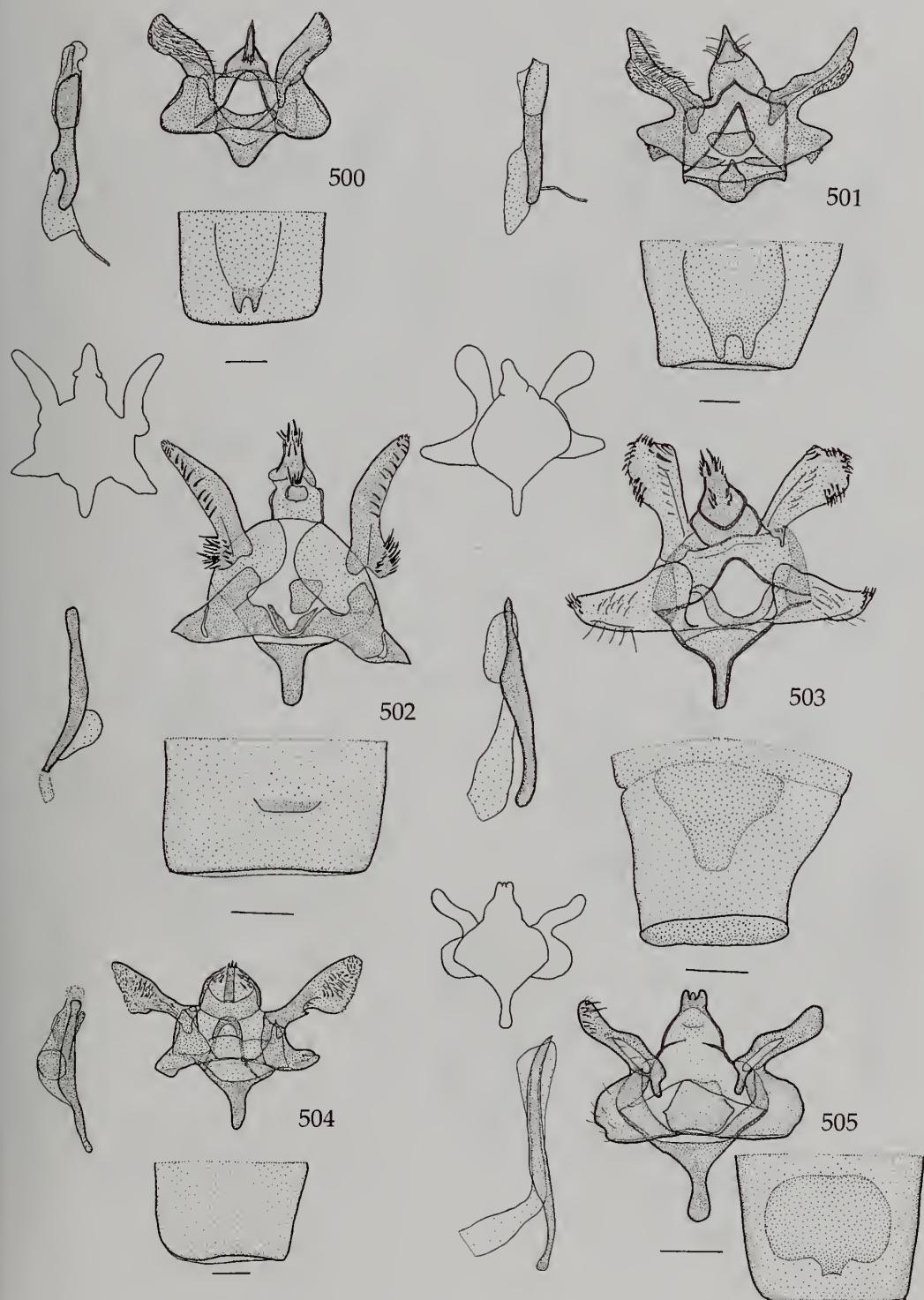


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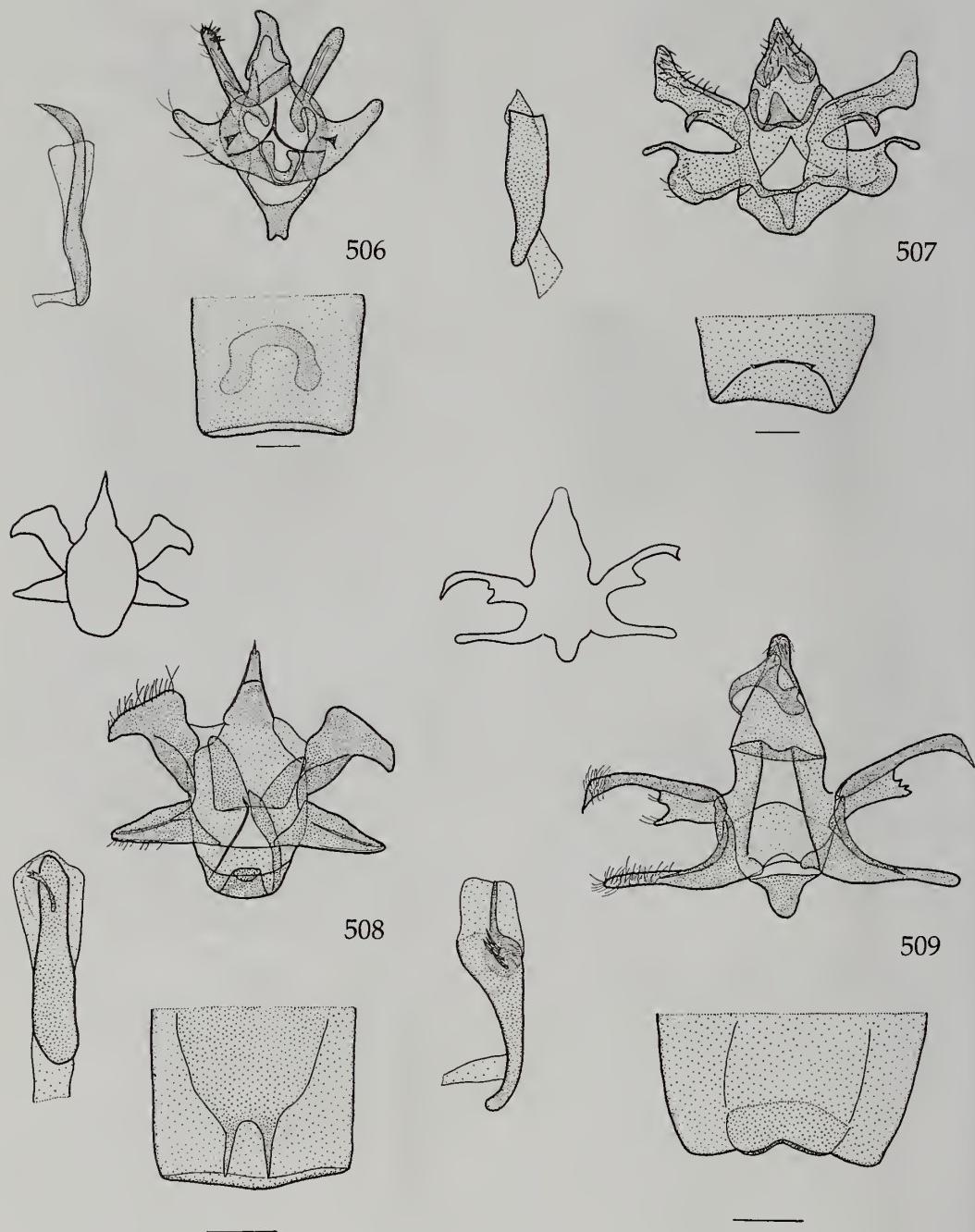


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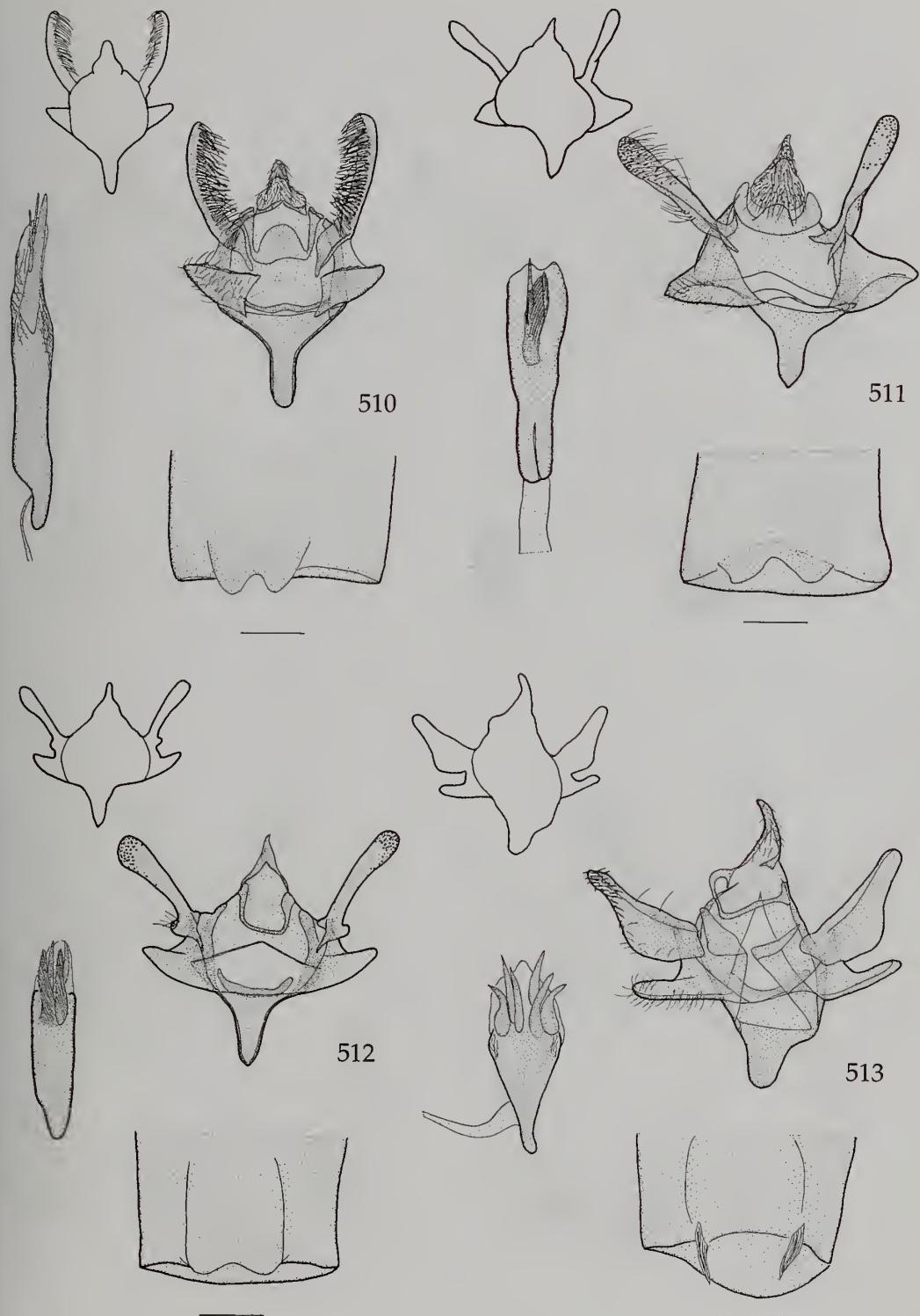
Figs 496–499. Adults. 496, *C. normata* (Walker); 497, '*Semiothisa*' *peyrierasi* (Vienne); 498, 499, *Malgassothisa trifida* Herbulot. Scale-bar = 5 mm.



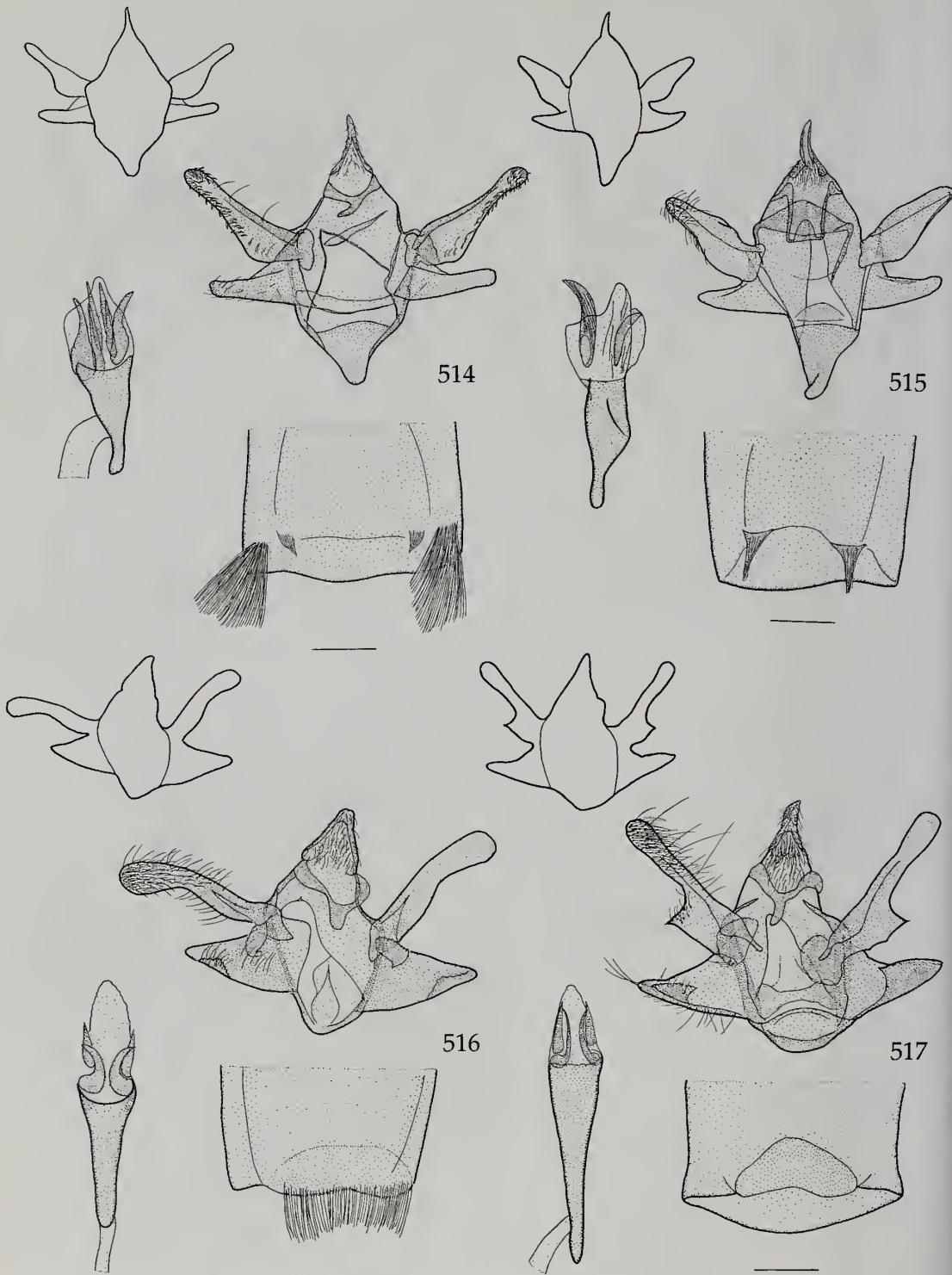
Figs 500–505. Male genitalia. 500, *Acanthovalva inconspicuaria* (Hübner); 501, *A. magna* sp. n.; 502, *A. capensis* sp. n.; 503, *A. itremo* sp. n.; 504, *A. bilineata* (Warren); 505, *A. focularia* (Geyer). Scale-bar = 0.3 mm.



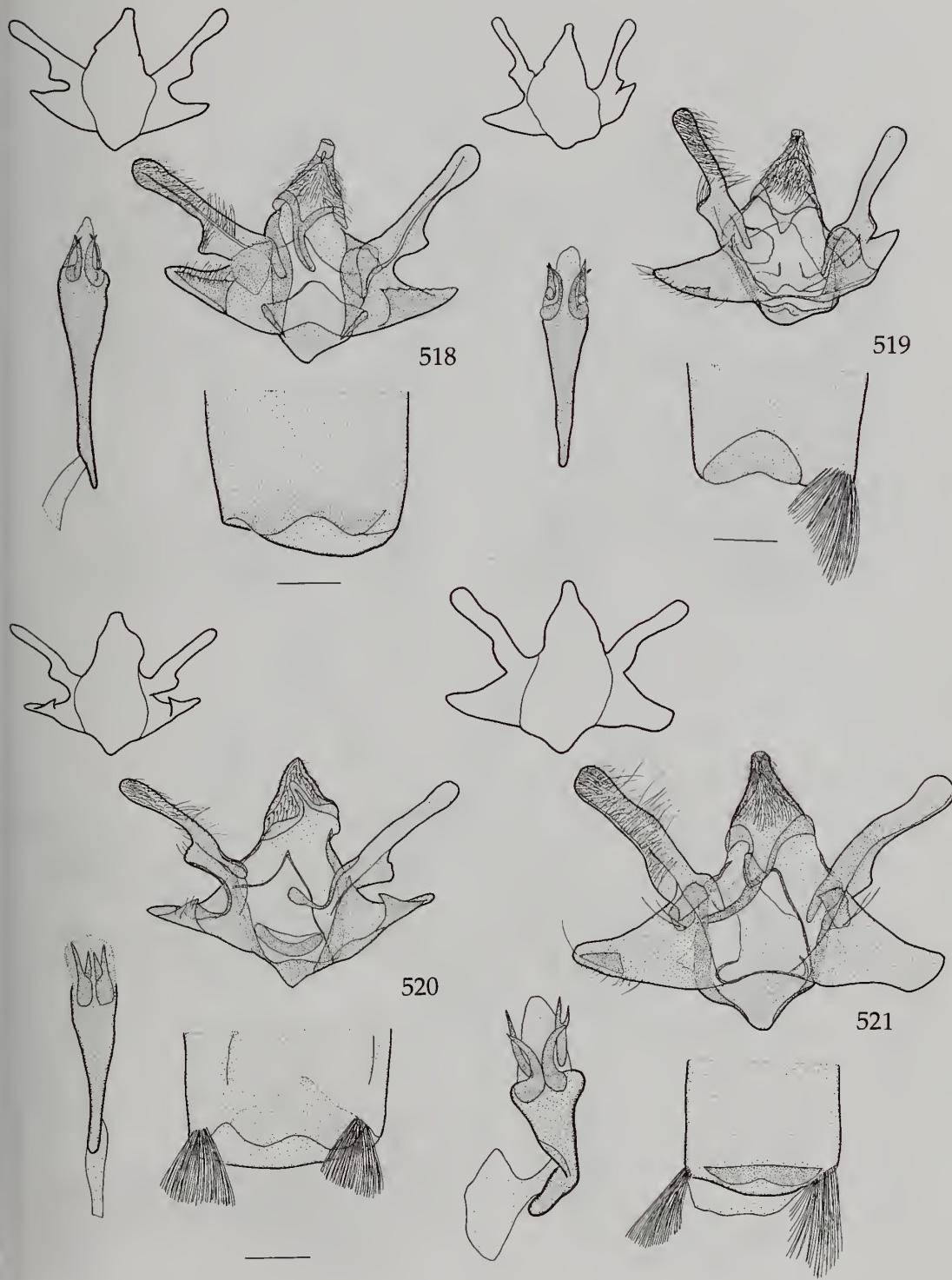
Figs 506–509. Male genitalia. 506, *Narraga n. nelvae* (Rothschild); 507, *P. acrobelia* (Wallengren); 508, *Sphyrocosta madecassa* (Viete); 509, *Milocera horaria* Swinhoe. Scale-bar = 0.3 mm.



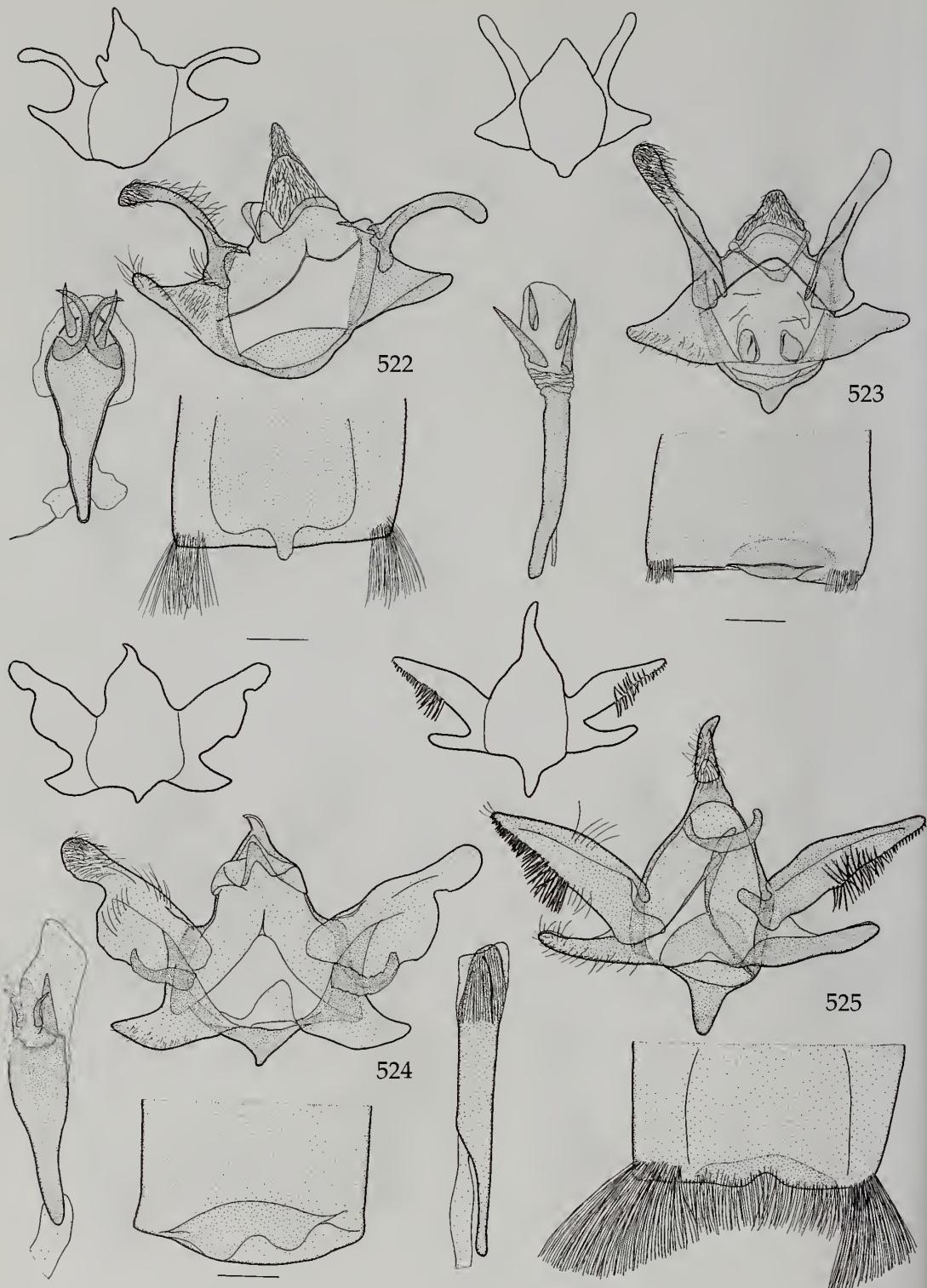
Figs 510–513. Male genitalia. 510, *Milocera eugompha* sp. n.; 511, *M. podocarpi* Prout; 512, *M. depauperata* sp. n.; 513, *M. sexcornuta* sp. n. Scale-bar = 0.3 mm.



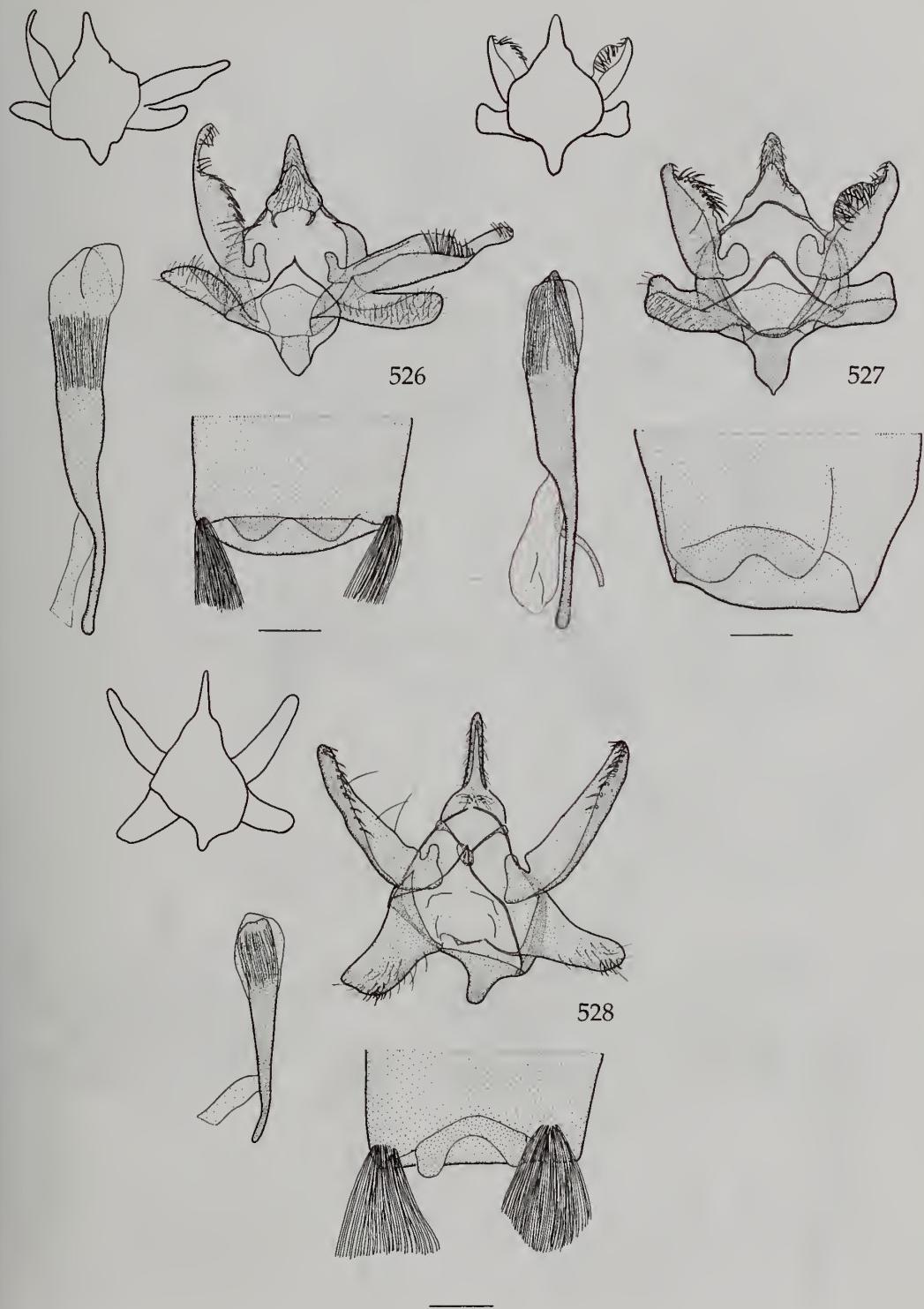
Figs 514–517. Male genitalia. 514, *Milocera herbuloti* sp. n.; 515, *M. pyrinia* Prout; 516, *M. ustatoides* sp. n.; 517, *M. diffusata* (Warren). Scale-bar = 0.3 mm.



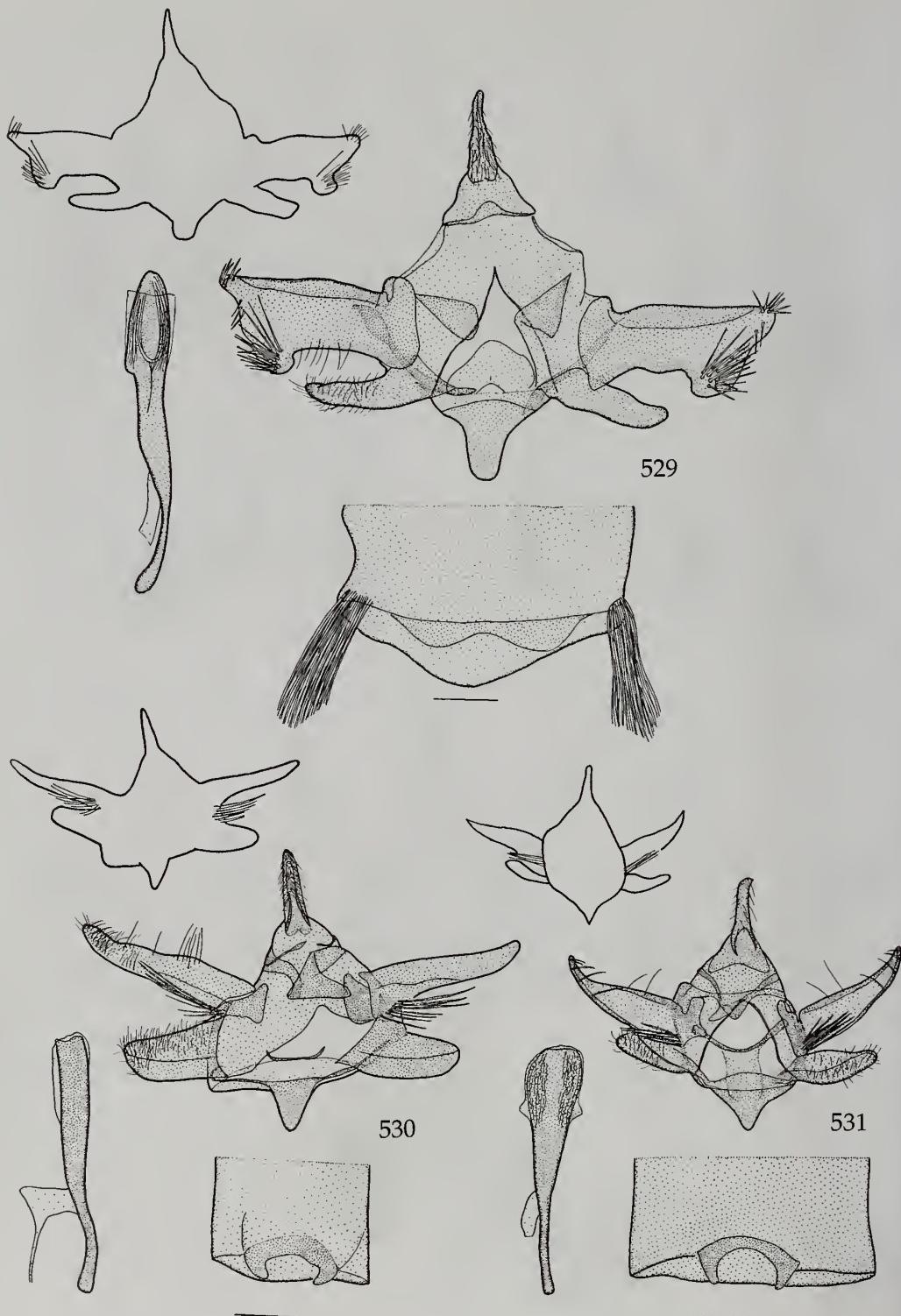
Figs 518–521. Male genitalia. 518, *Milocera zika* sp. n.; 519, *M. ja* sp. n.; 520, *M. scoblei* sp. n.; 521, *M. aurora* sp. n.  
Scale-bar = 0.3 mm.



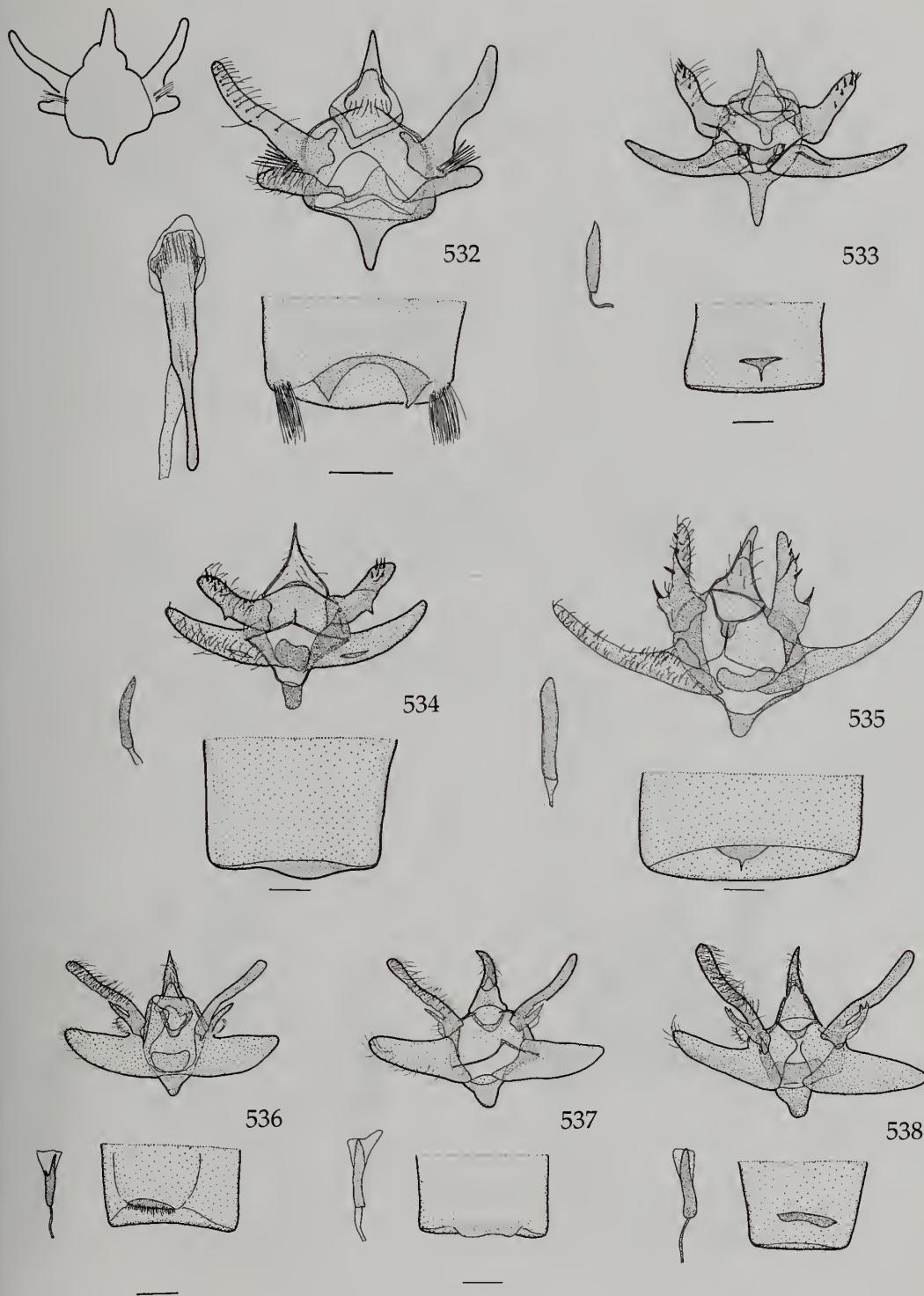
Figs 522–525. Male genitalia. 522, *Milocera obfuscata* sp. n.; 523, *M. ustata* Herbuleot; 524, *M. umbrosa* Herbuleot; 525, *M. arcifera* (Prout). Scale-bar = 0.3 mm.



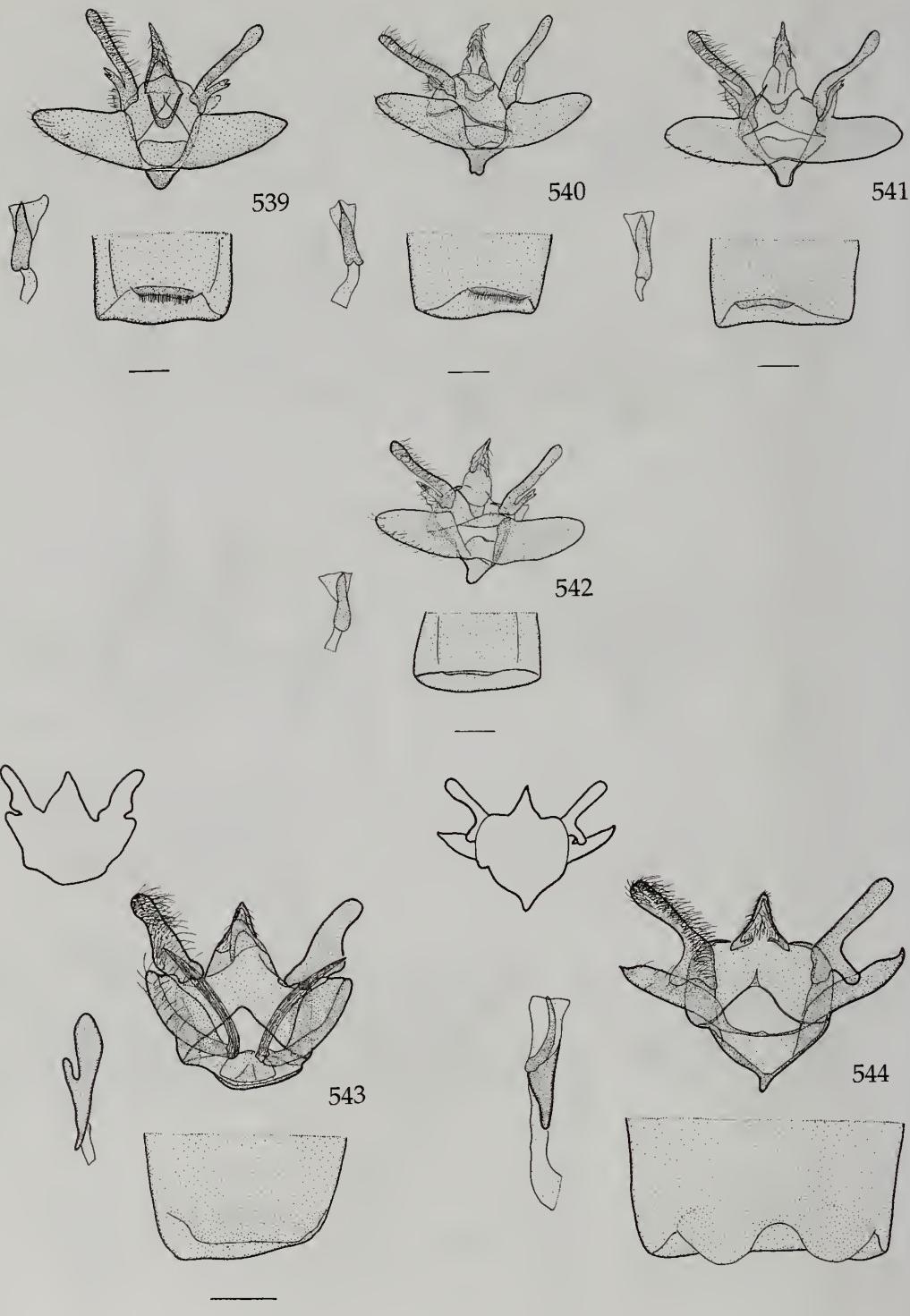
Figs 526–528. Male genitalia. 526, *Milocera pelops* sp. n.; 527, *M. divorsa* Prout; 528, *M. thyestes* sp. n. Scale-bar = 0.3 mm.



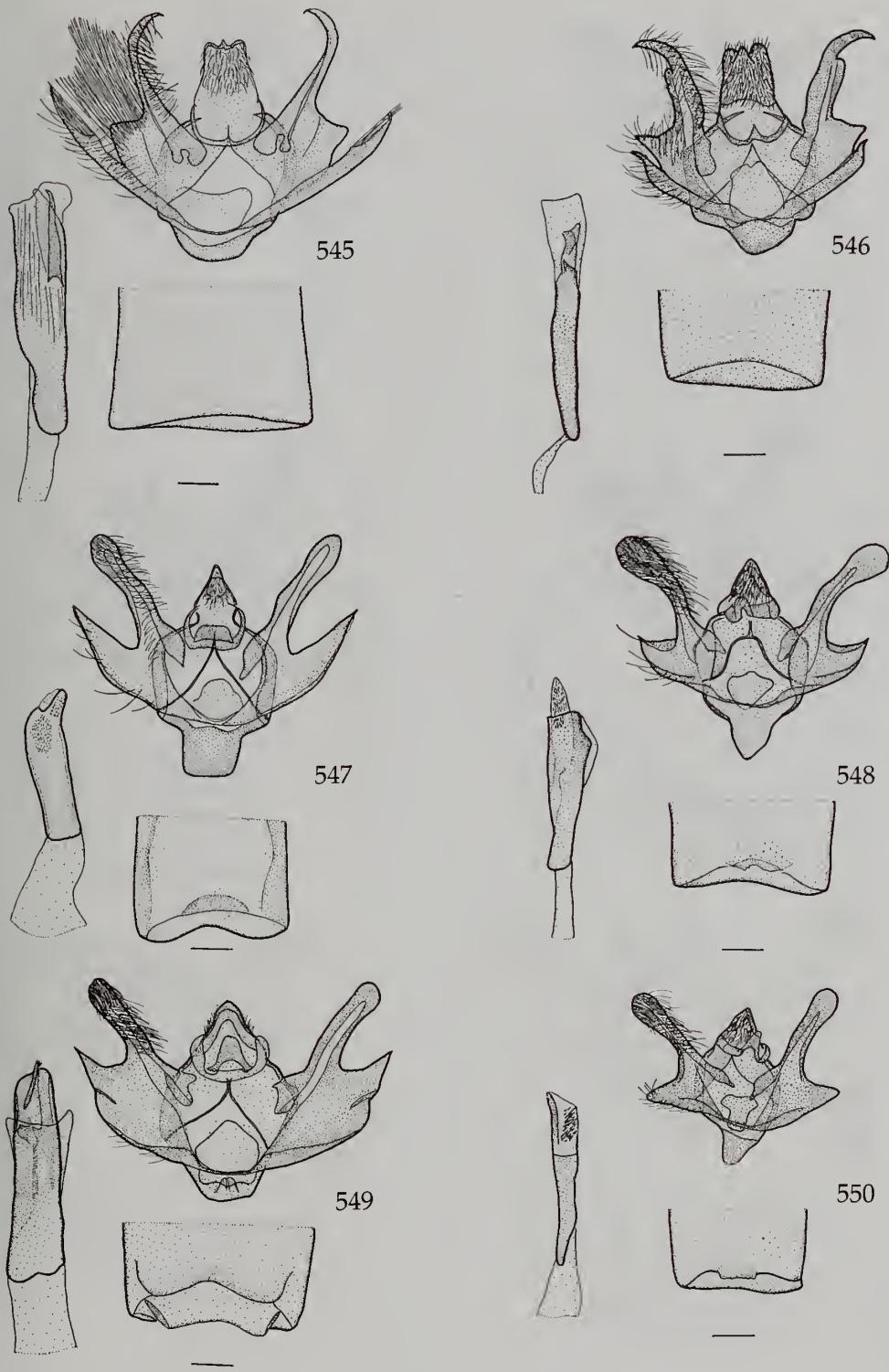
Figs 529–531. Male genitalia. 529, *Milocera hypamycha* sp. n.; 530, *M. dubia* (Prout); 531, *M. atreus* sp. n. Scale-bar = 0.3 mm.



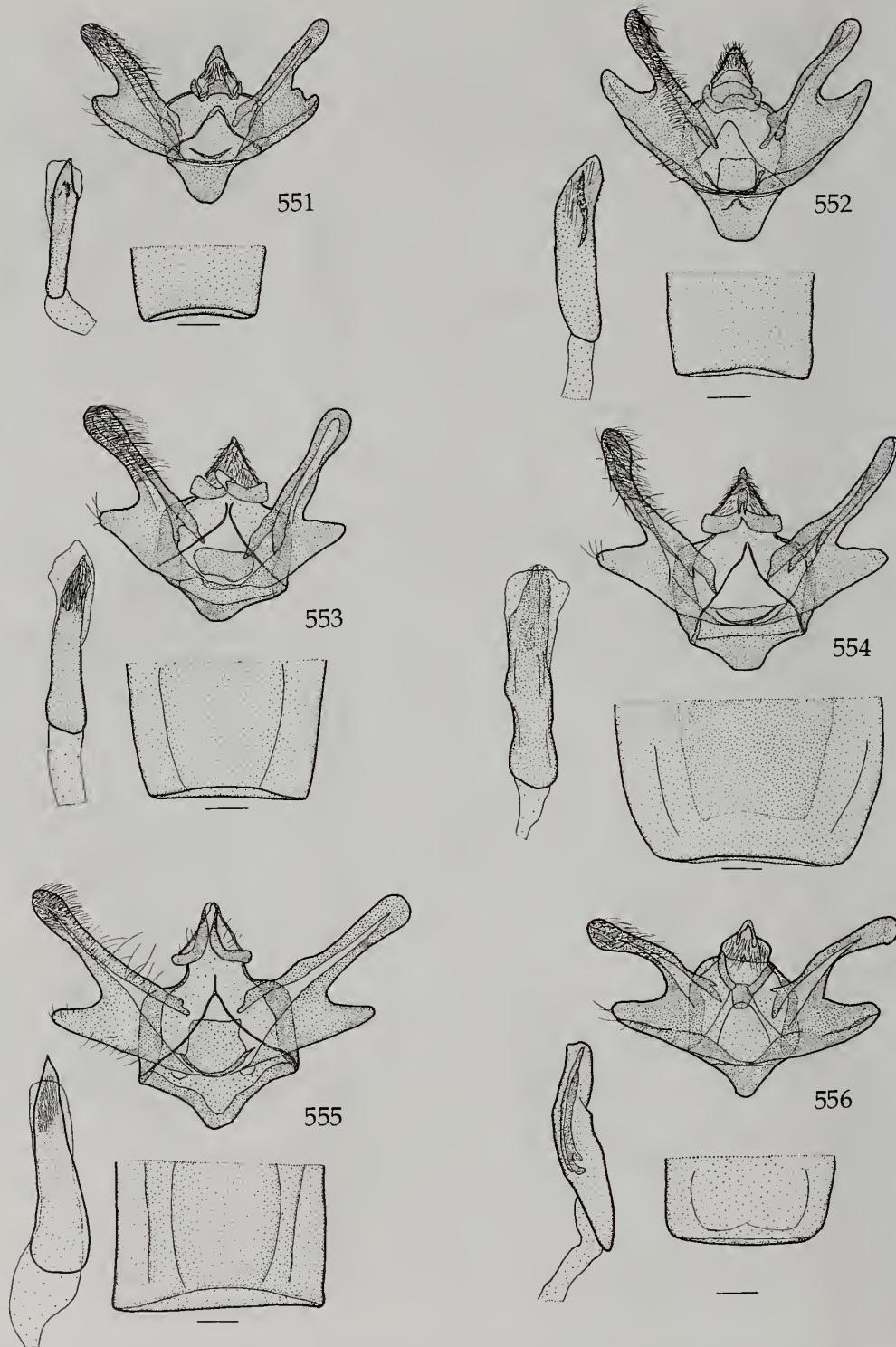
Figs 532–538. Male genitalia. 532, *Milocera tantalus* sp. n.; 533, *Platypepla spurcata* (Warren); 534, *P. jordani* sp. n.; 535, *P. uhlenhuthi* sp. n.; 536, *P. macilenta* sp. n.; 537, *P. griseobrunnea* sp. n.; 538, *P. loranthiphaga* sp. n. Scale-bar = 0.3 mm.



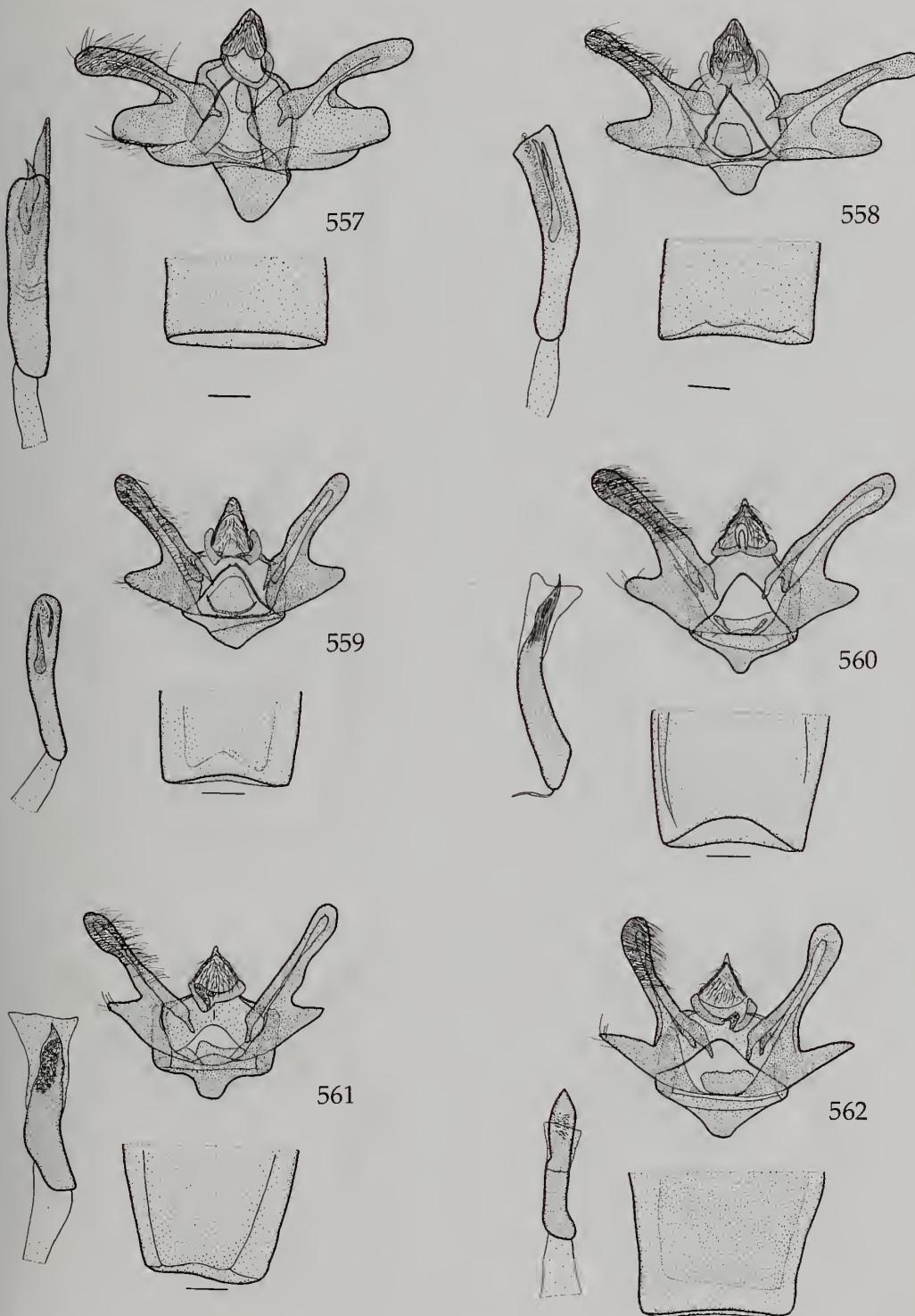
Figs 539–544. Male genitalia. 539, *Platypepla flava* sp. n.; 540, *P. persubtilis* sp. n.; 541, *P. pseudospurcata* sp. n.; 542, *P. mackayi* sp. n.; 543, *P. schistopenis* sp. n.; 544, *P. curvigliadiata* sp. n. Scale-bar = 0.3 mm.



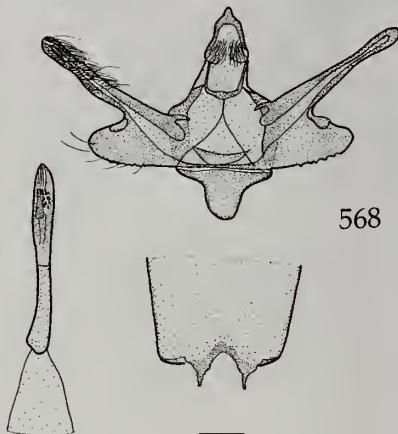
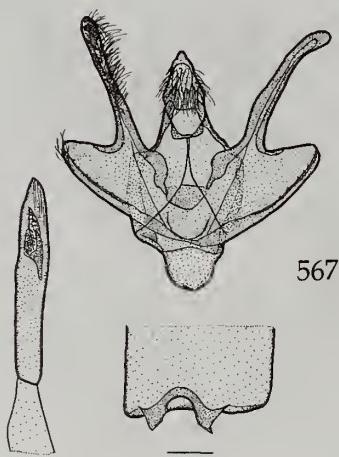
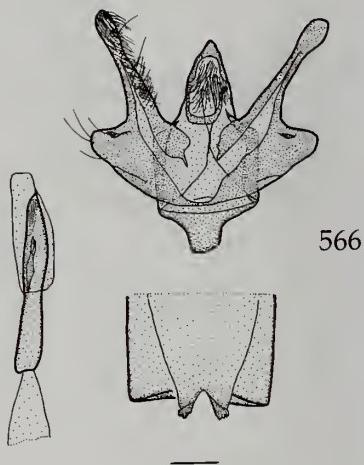
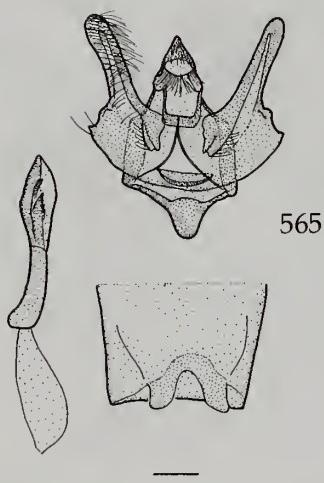
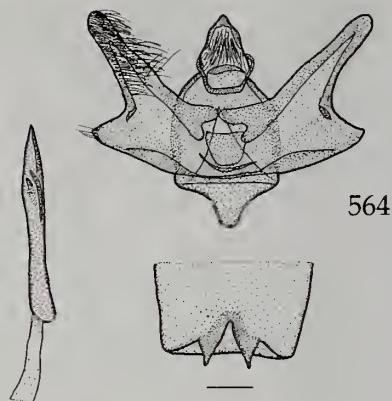
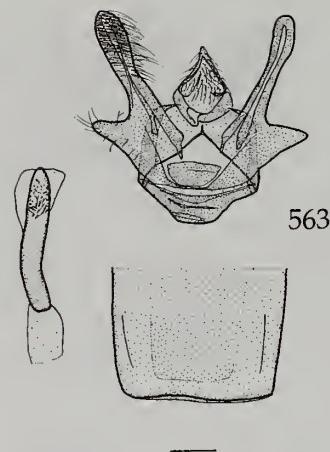
Figs 545–550. Male genitalia. 545, *Chelotephrina crypsispila* (Fletcher); 546, *C. acorema* sp. n.; 547, *Tephritis murinaria* (D. & S.J.); 548, *Isturgia catalaunaria* (Guenée); 549, *I. triseriata* (Prout); 550, *I. univirgaria* (Mabille). Scale-bar = 0.3 mm.



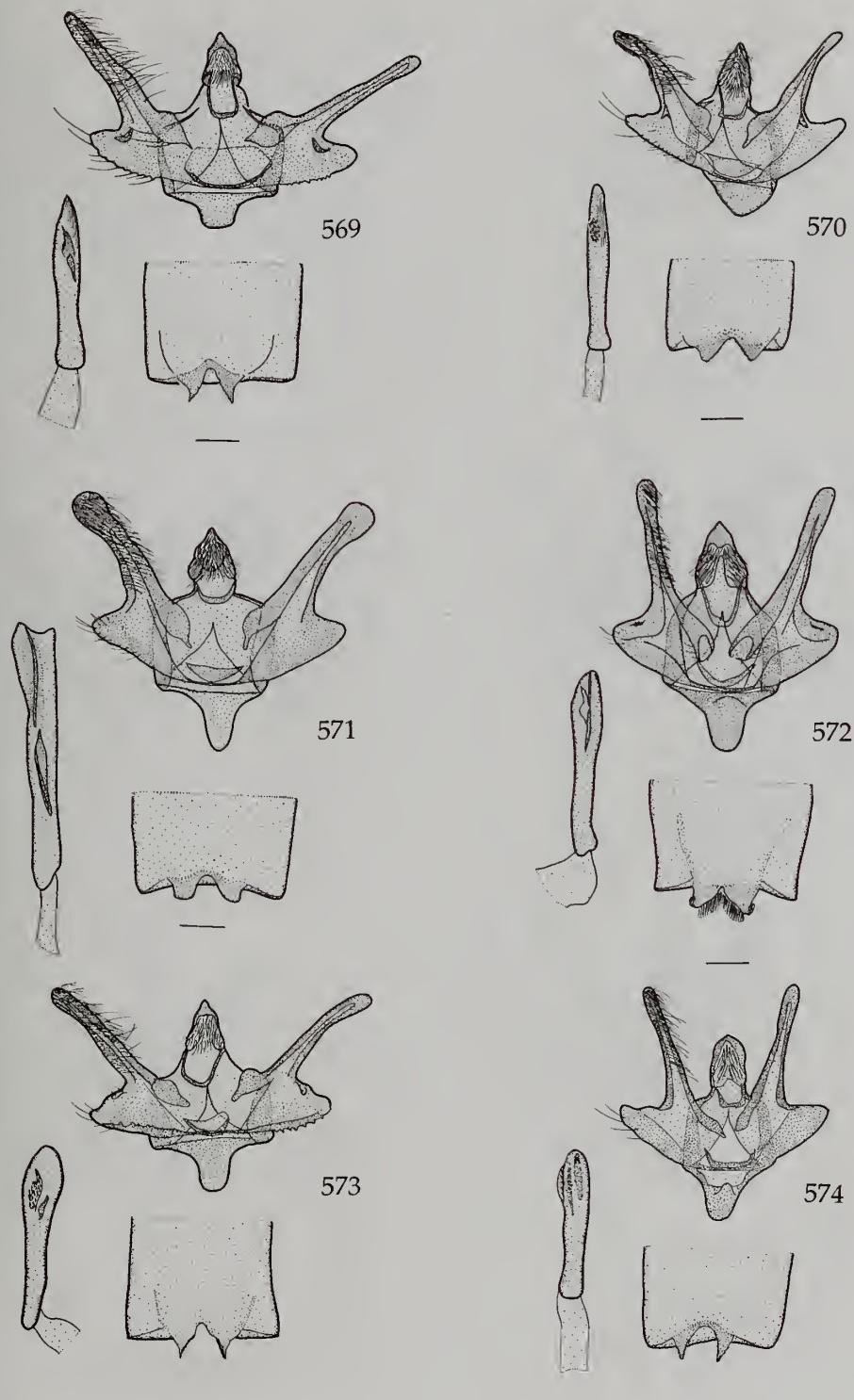
Figs 551–556. Male genitalia. 551, *Isturgia dukuduku* sp. n.; 552, *I. sakalava* (Herbulot); 553, *I. miniosaria duponcheli* (Prout); 554, *I. hausmanni* sp. n.; 555, *I. terminipuncta* sp. n.; 556, *I. supergressa* (Prout). Scale-bar = 0.3 mm.



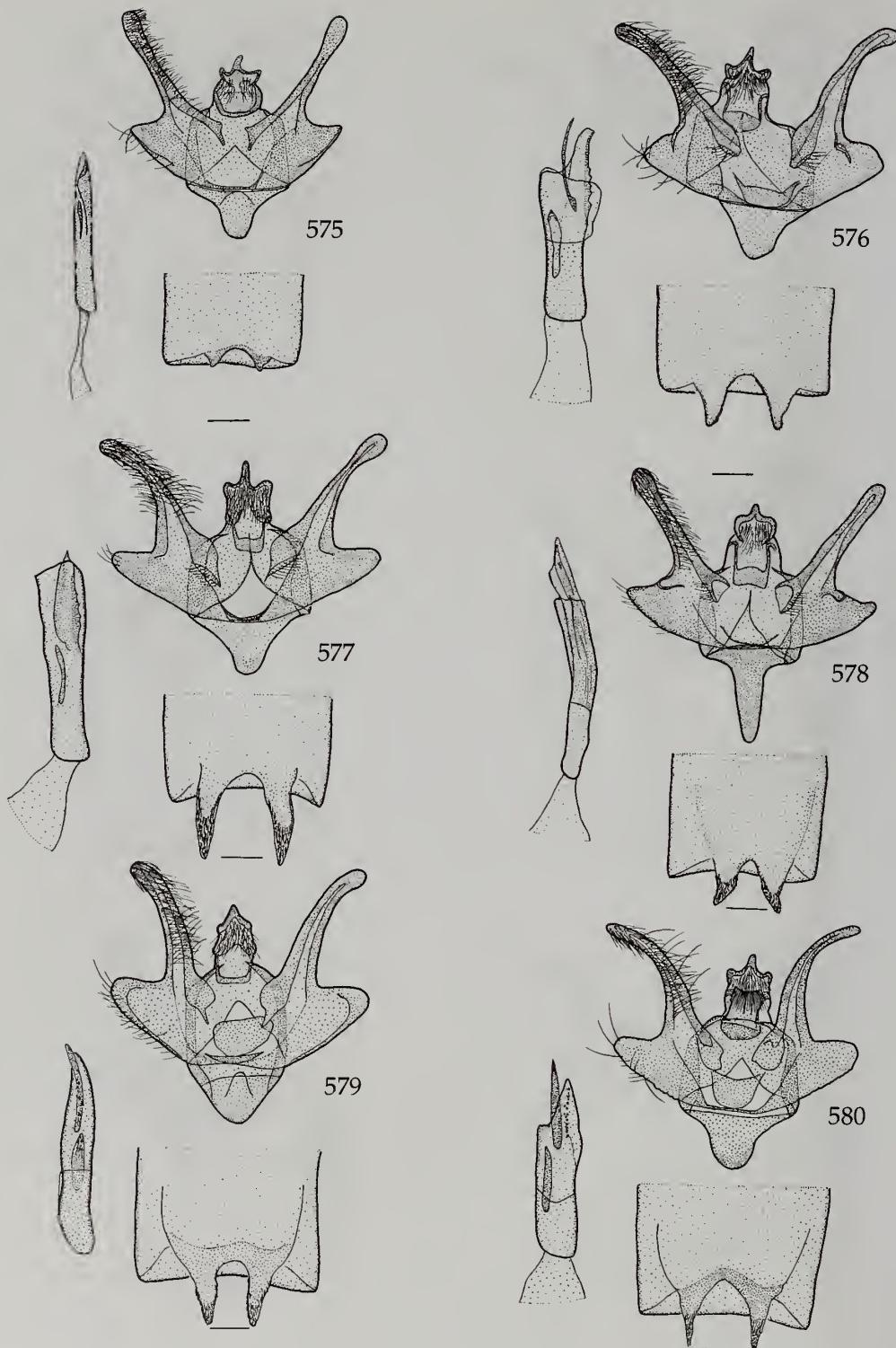
Figs 557–562. Male genitalia. 557, *Isturgia exospilata* (Walker); 558, *I. contexta* (Saalmüller); 559, *I. averyi* (Valette); 560, *I. berytaria* (Staudinger); 561, *I. spodiaria mizanensis* (Wehrli); 562, *I. exustaria* (Staudinger). Scale bar = 0.3 mm.



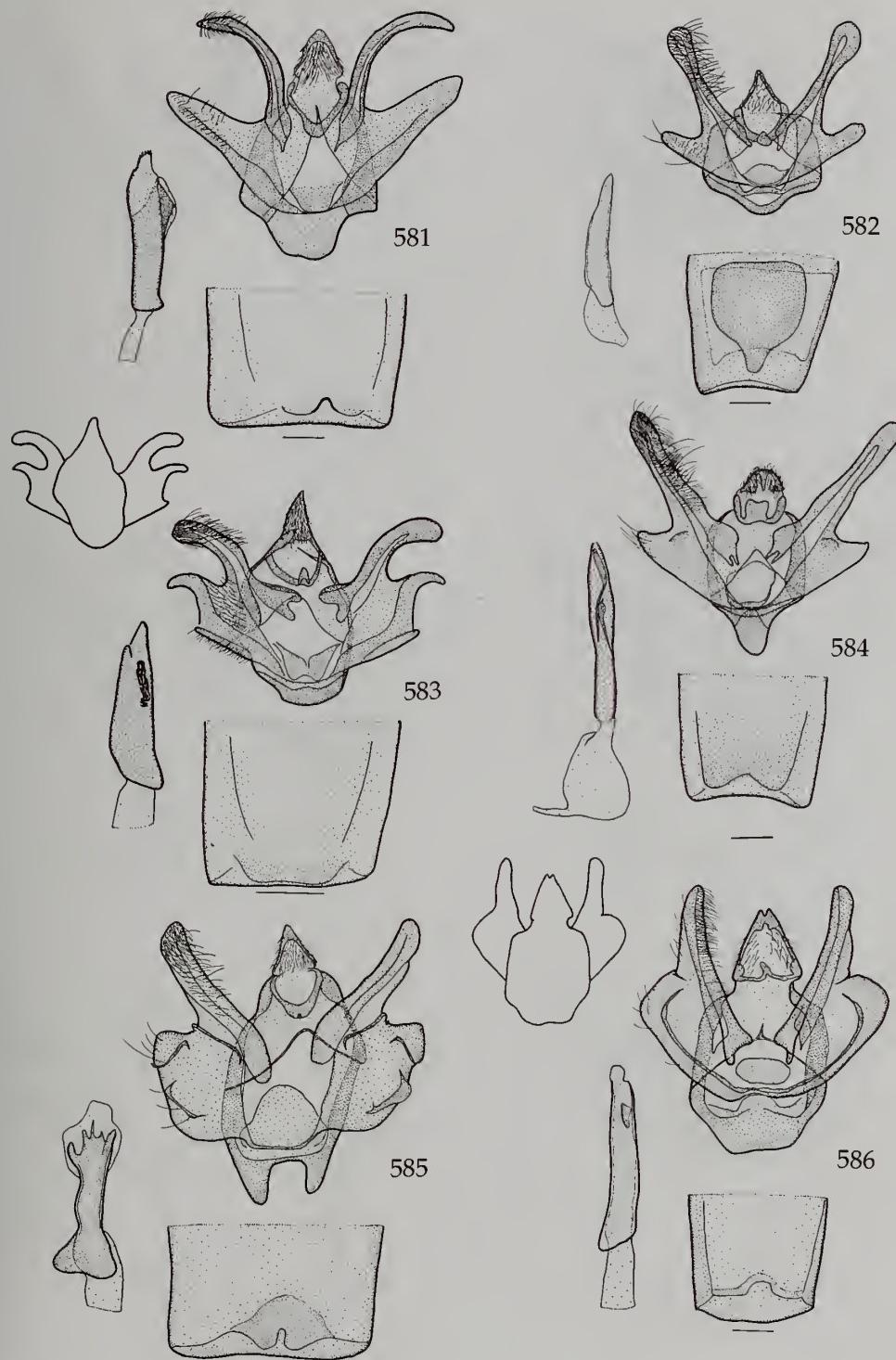
Figs 563–568. Male genitalia. 563, *Isturgia rubrior* (Hausmann); 564, *I. disputaria* (Guenée); 565, *I. netta* (Holland); 566, *I. exerraria* (Prout); 567, *I. deerraria* (Walker); 568, *I. pygmaeata* sp. n. Scale-bar = 0.3 mm.



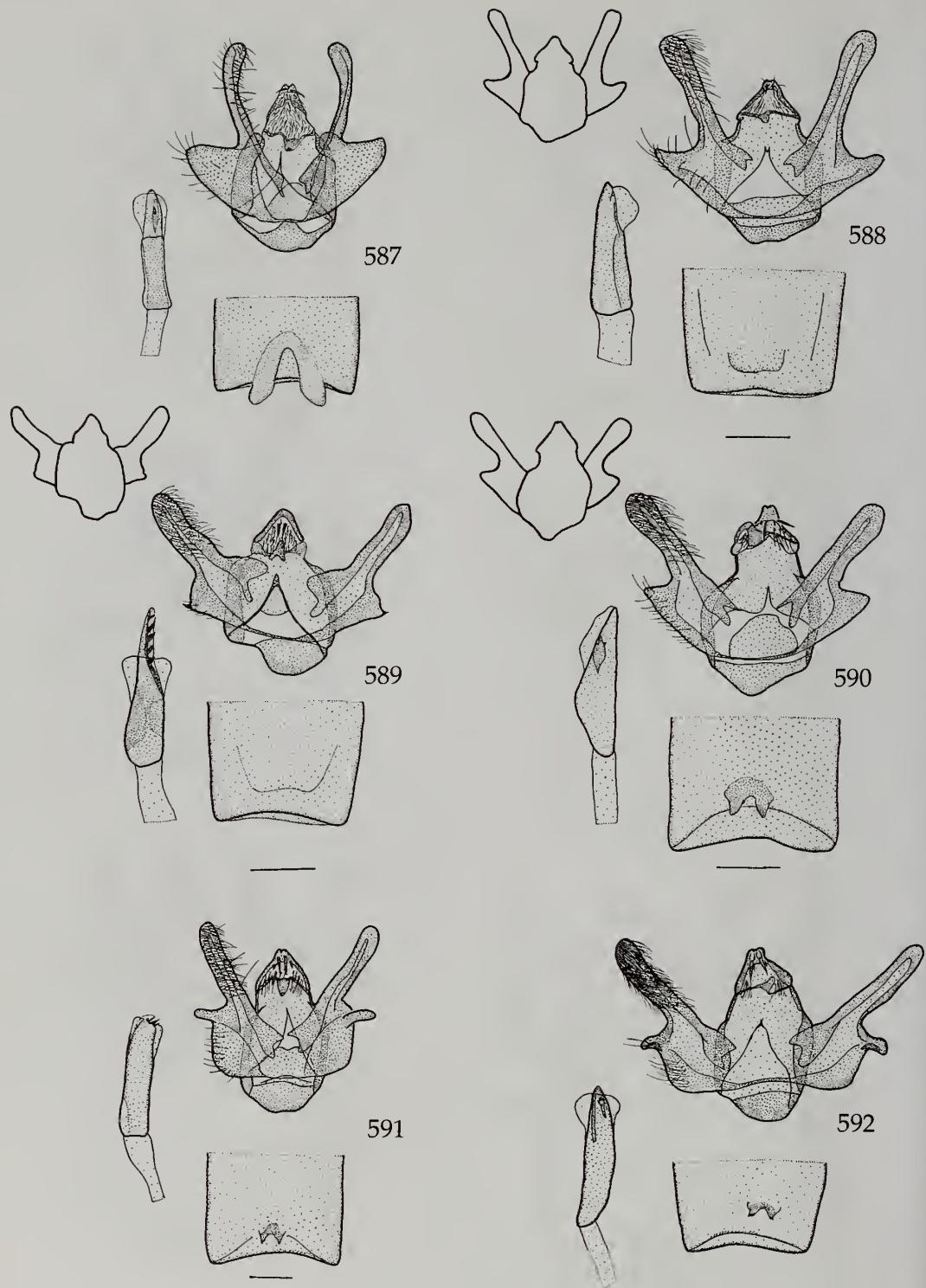
**Figs 569–574.** Male genitalia. 569, *Isturgia griveaudi* sp. n.; 570, *I. perviaria* (Lederer); 571, *I. sublimbata* (Butler); 572, *I. arizela* (Fletcher); 573, *I. quadriplaga* (Rothschild); 574, *I. philbyi* (Wiltshire). Scale-bar = 0.3 mm.



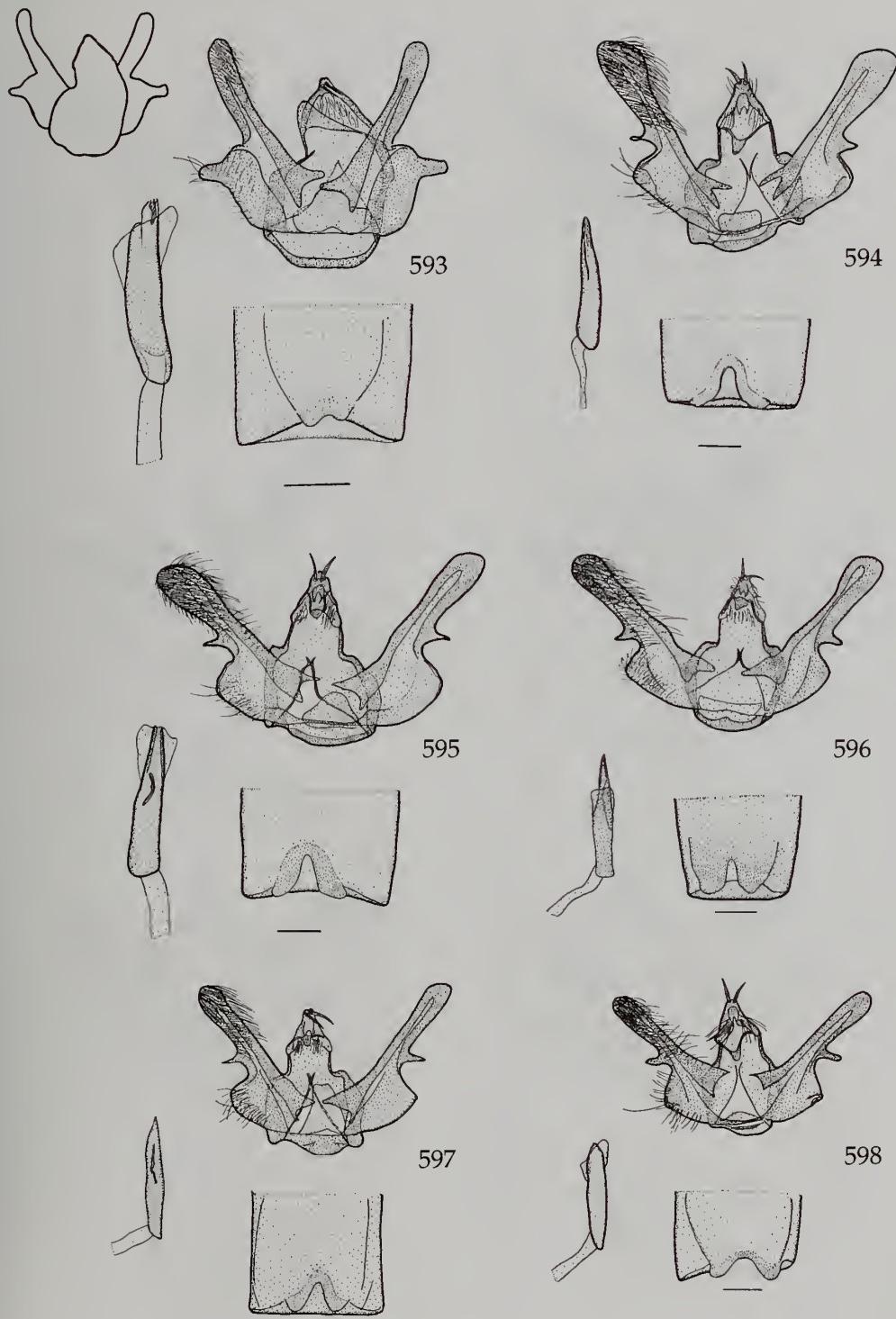
Figs 575–580. Male genitalia. 575, *Isturgia spissata* (Walker); 576, *I. arizeloides* sp. n.; 577, *I. albogrisea* sp. n.; 578, *I. megasaccus* sp. n.; 579, *I. presbitaria* (Swinhoe); 580, *I. virescens* sp. n. Scale-bar = 0.3 mm.



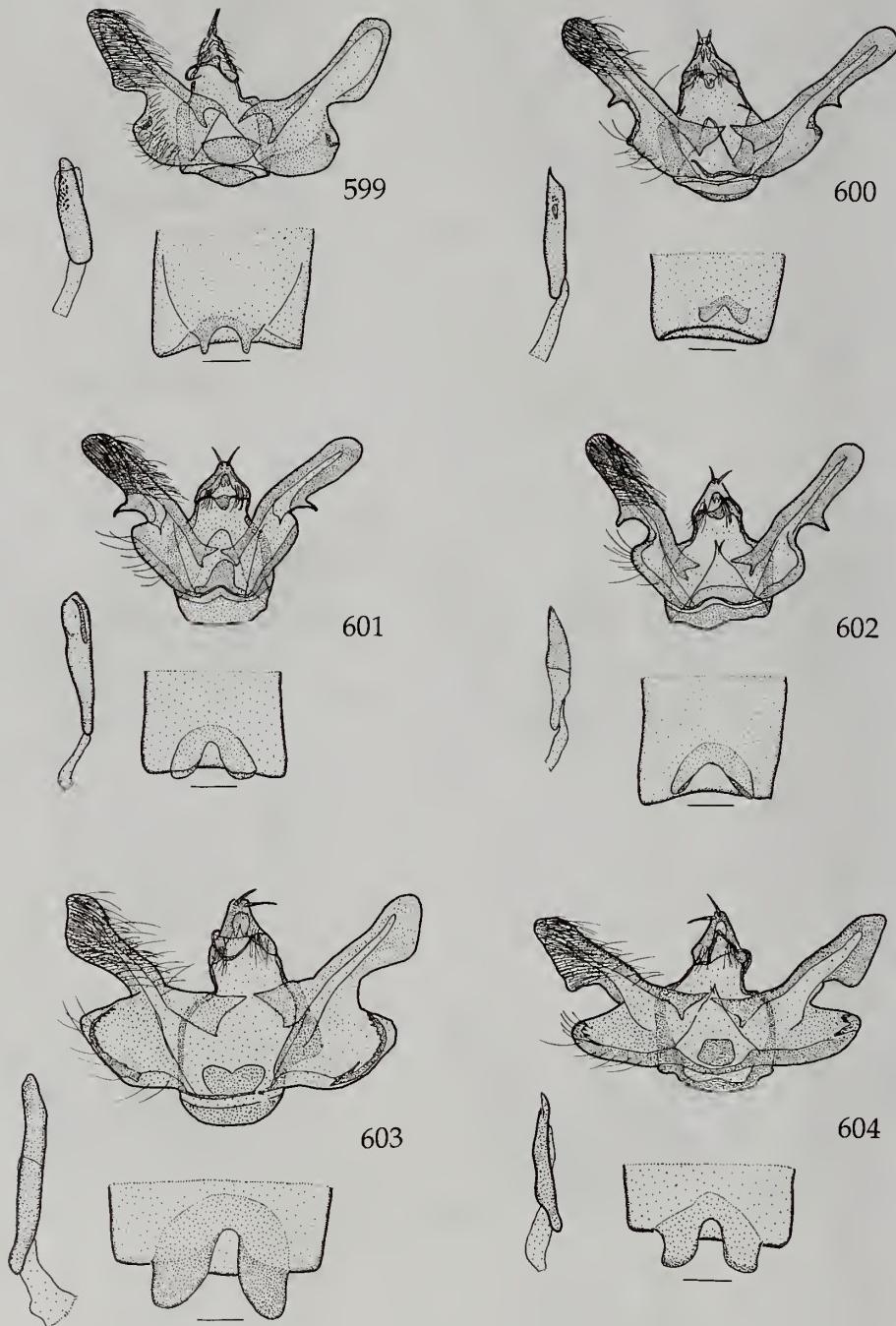
Figs 581–586. Male genitalia. 581, *Isturgia devecta* (Herbulot); 582, *I. famula brunnea* (Le Cerf); 583, *I. geminata* (Warren); 584, *I. perplexa* sp. n.; 585, *Itame vincularia* (Hübner); 586, *Boarmioides colpias* (Prout). Scale-bar = 0.3 mm.



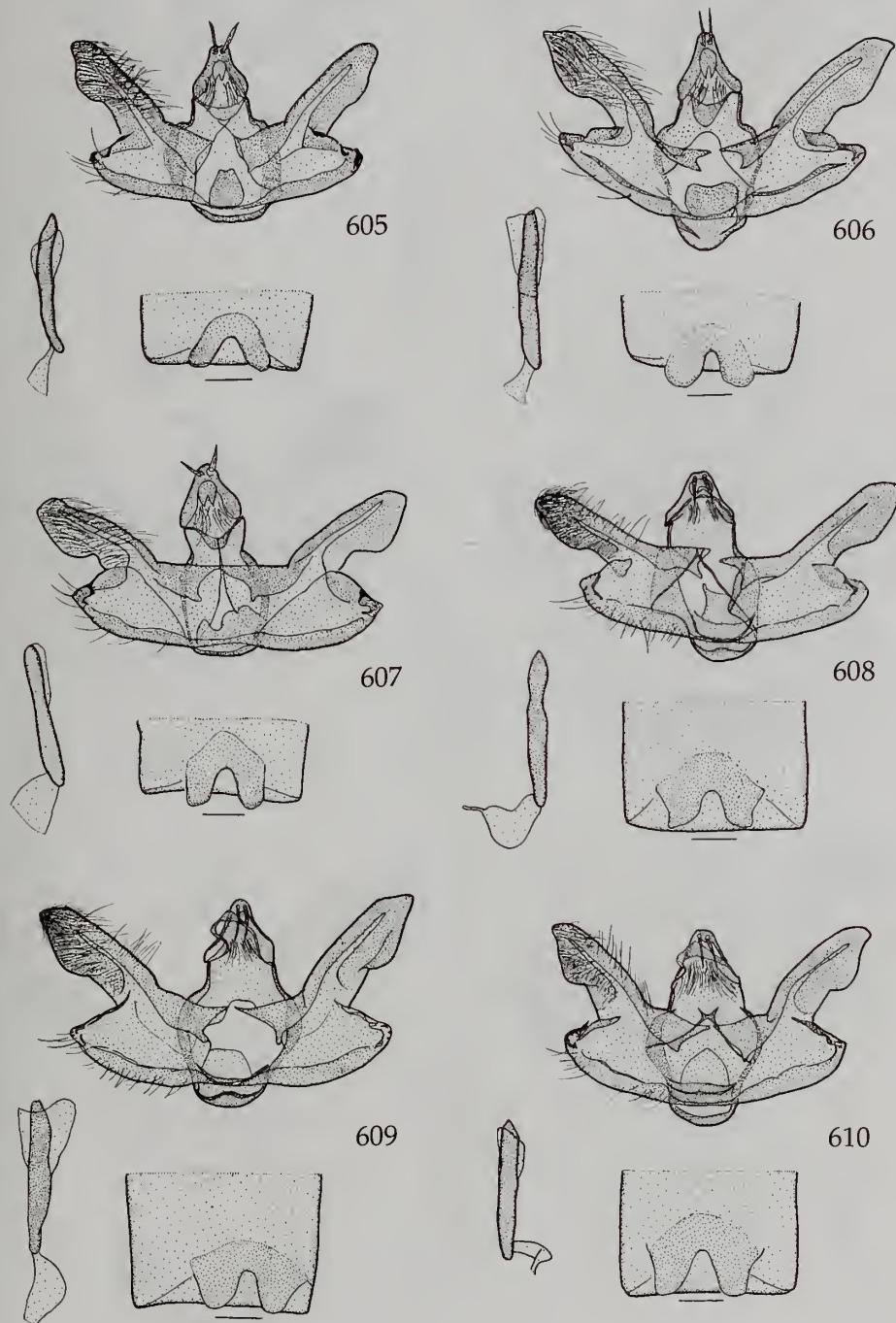
Figs 587–592. Male genitalia. 587, *Macaria wauaria africana* (Zerny); 588, *Chiasmia calvifrons* (Prout); 589, *C. puerilis* (Prout); 590, *C. featheri* (Prout); 591, *C. zelota* (Prout); 592, *C. ate* (Prout). Scale-bar = 0.3 mm.



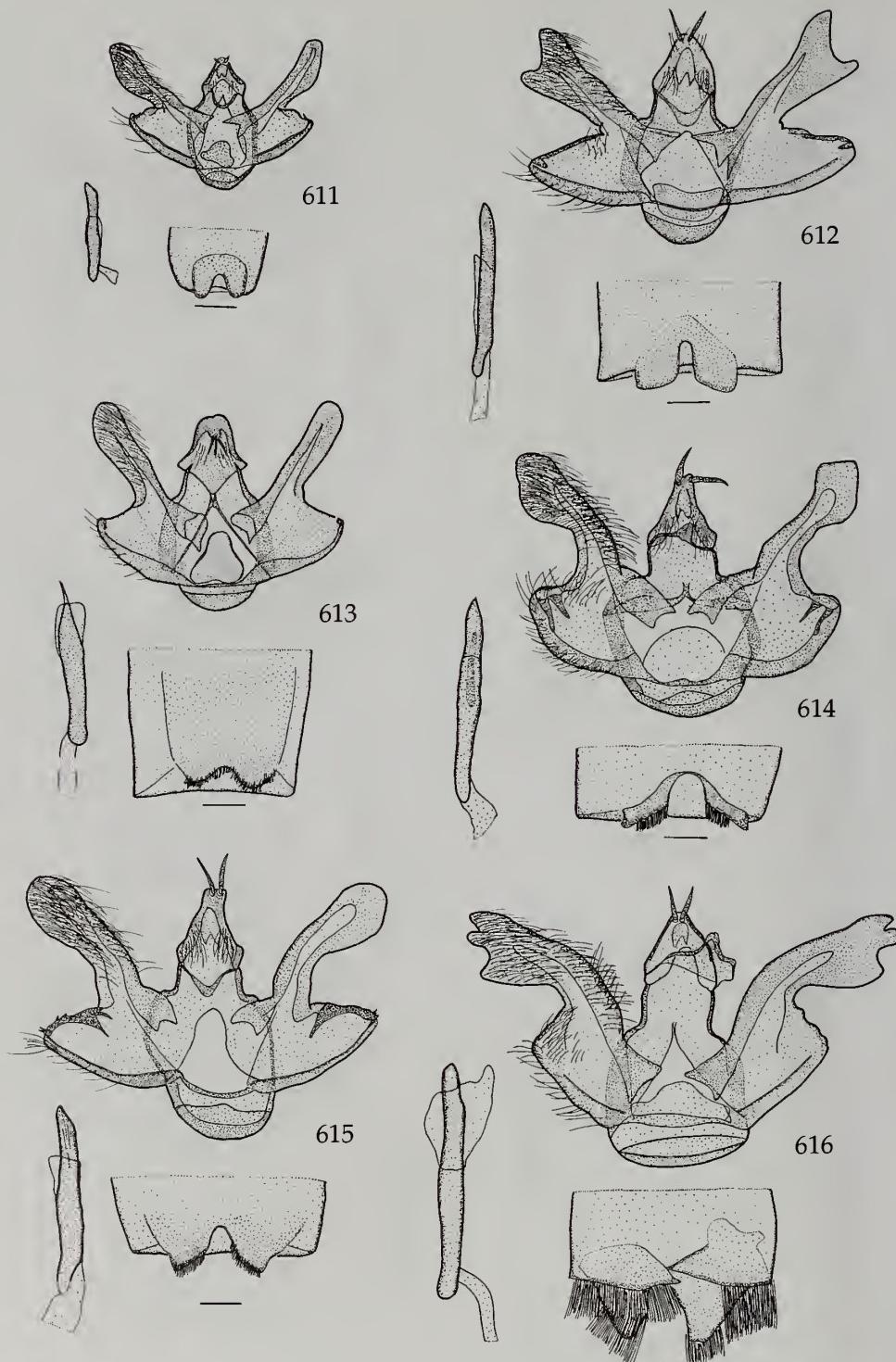
Figs 593–598. Male genitalia. 593, *Chiasmia dodoma* sp. n.; 594, *C. tecnum* (Prout); 595, *C. monopepla* (Prout); 596, *C. frontosa* (Wiltshire); 597, *C. banian* (Viette); 598, *C. trinotata* (Warren). Scale-bar = 0.3 mm.



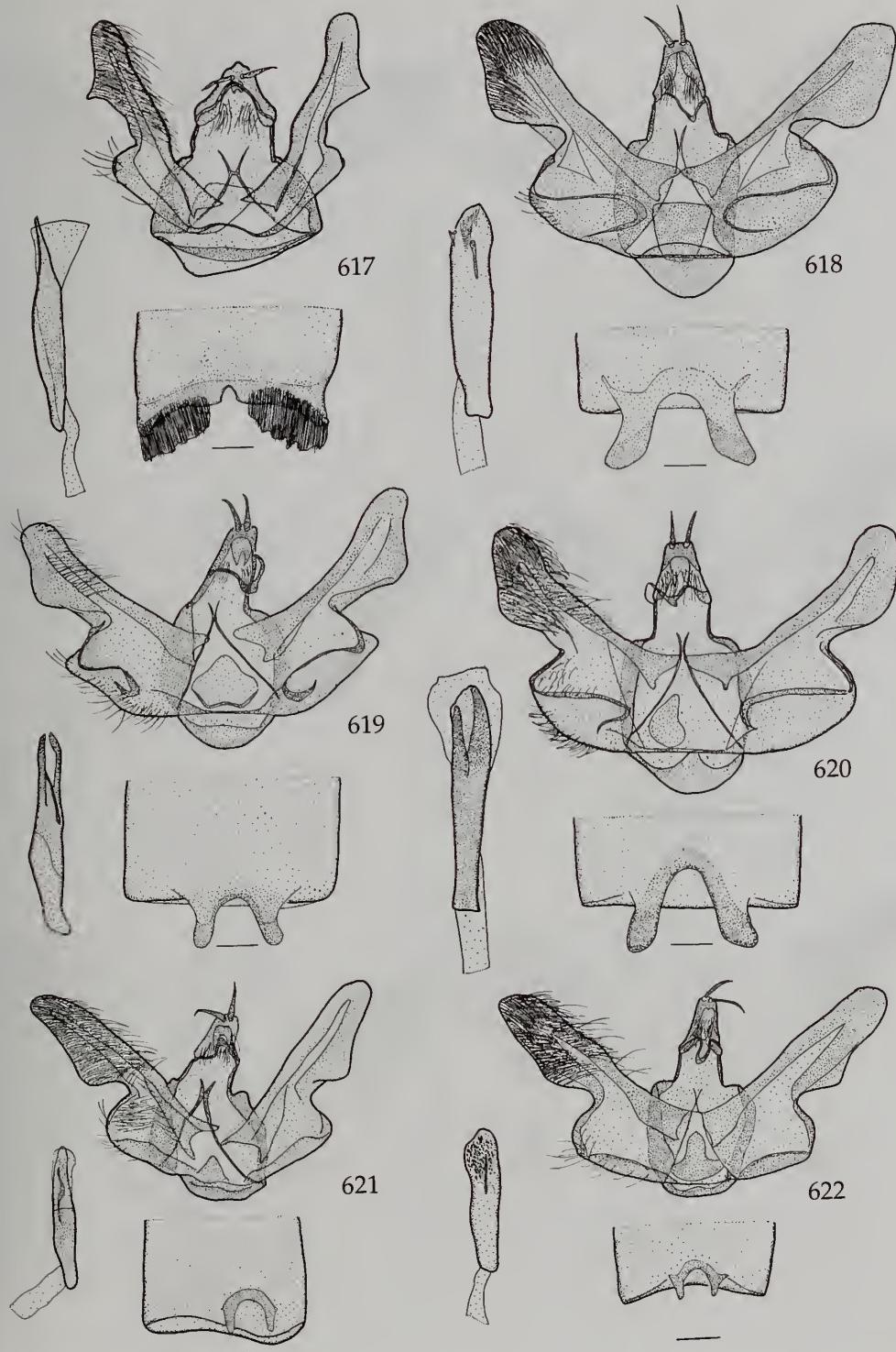
Figs 599–604. Male genitalia. 599, *Chiasmia trinotatula* sp. n.; 600, *C. diarmodia* (Prout); 601, *C. nubilata* (Warren); 602, *C. extrusilinea* (Warren); 603, *C. semitecta* (Walker); 604, *C. brunnescens* sp. n. Scale-bar = 0.3 mm.



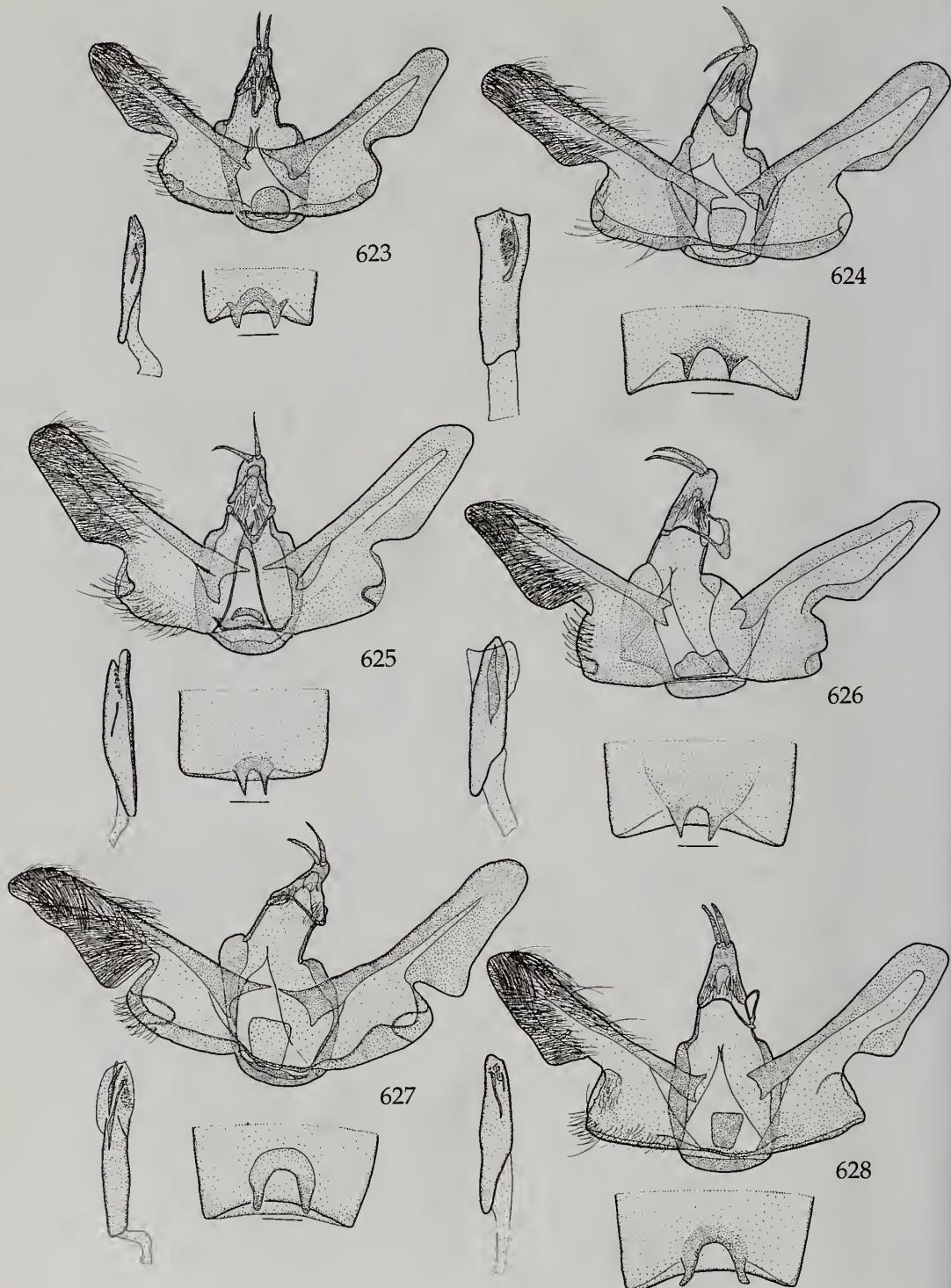
Figs 605–610. Male genitalia. 605, *Chiasmia grisescens* (Prout); 606, *C. murina* sp. n.; 607, *C. hunyani* sp. n.; 608, *C. bomfordi* sp. n.; 609, *C. pinheyi* sp. n.; 610, *C. deleta* sp. n. Scale-bar = 0.3 mm.



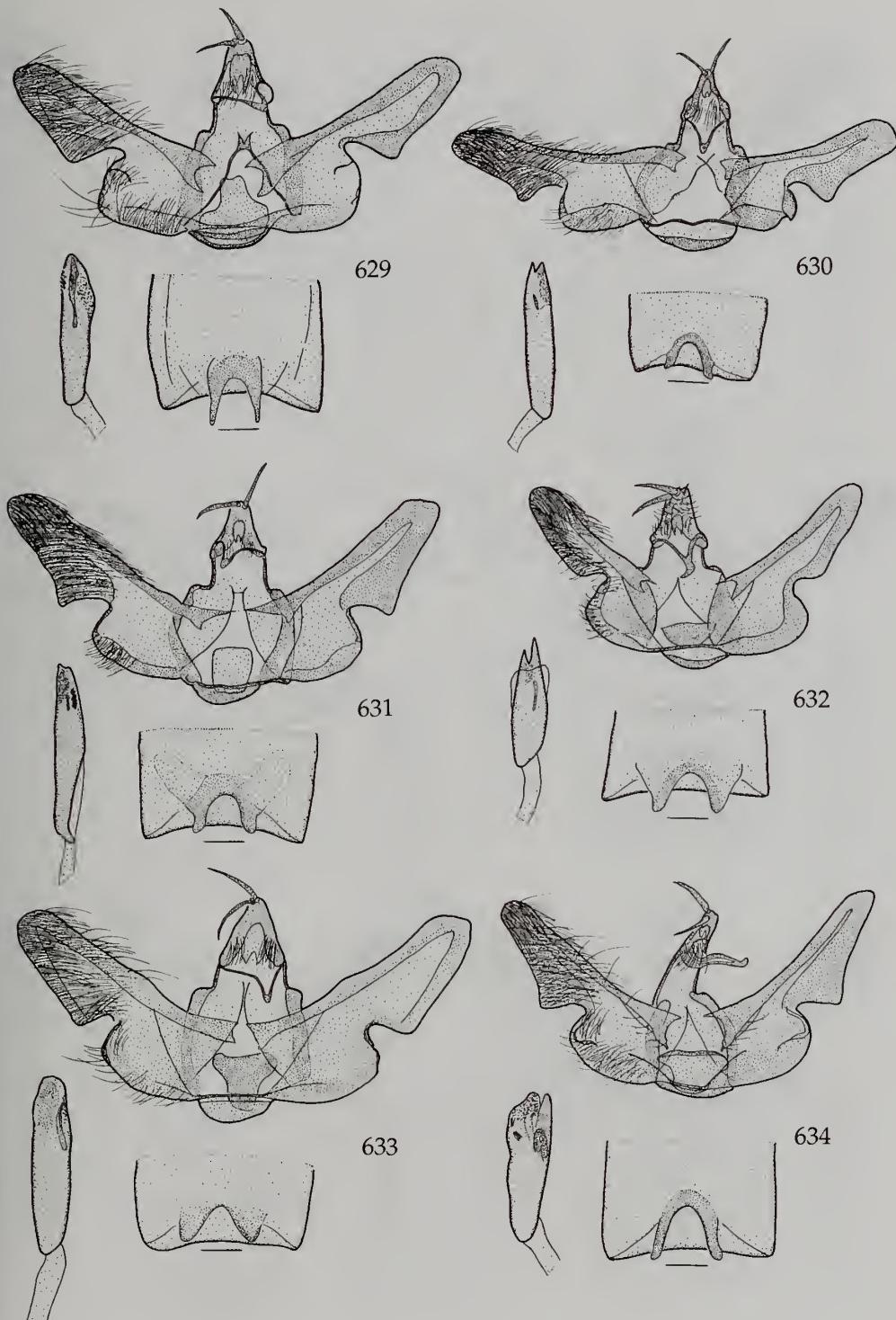
Figs 611–616. Male genitalia. 611, *Chiasmia alternata* (Warren); 612, *C. orthostates* (Prout); 613, *C. iringa* sp. n.; 614, *C. johnstoni* (Butler); 615, *C. semicolor* (Warren); 616, *C. rhabdophora* (Holland). Scale-bar = 0.3 mm.



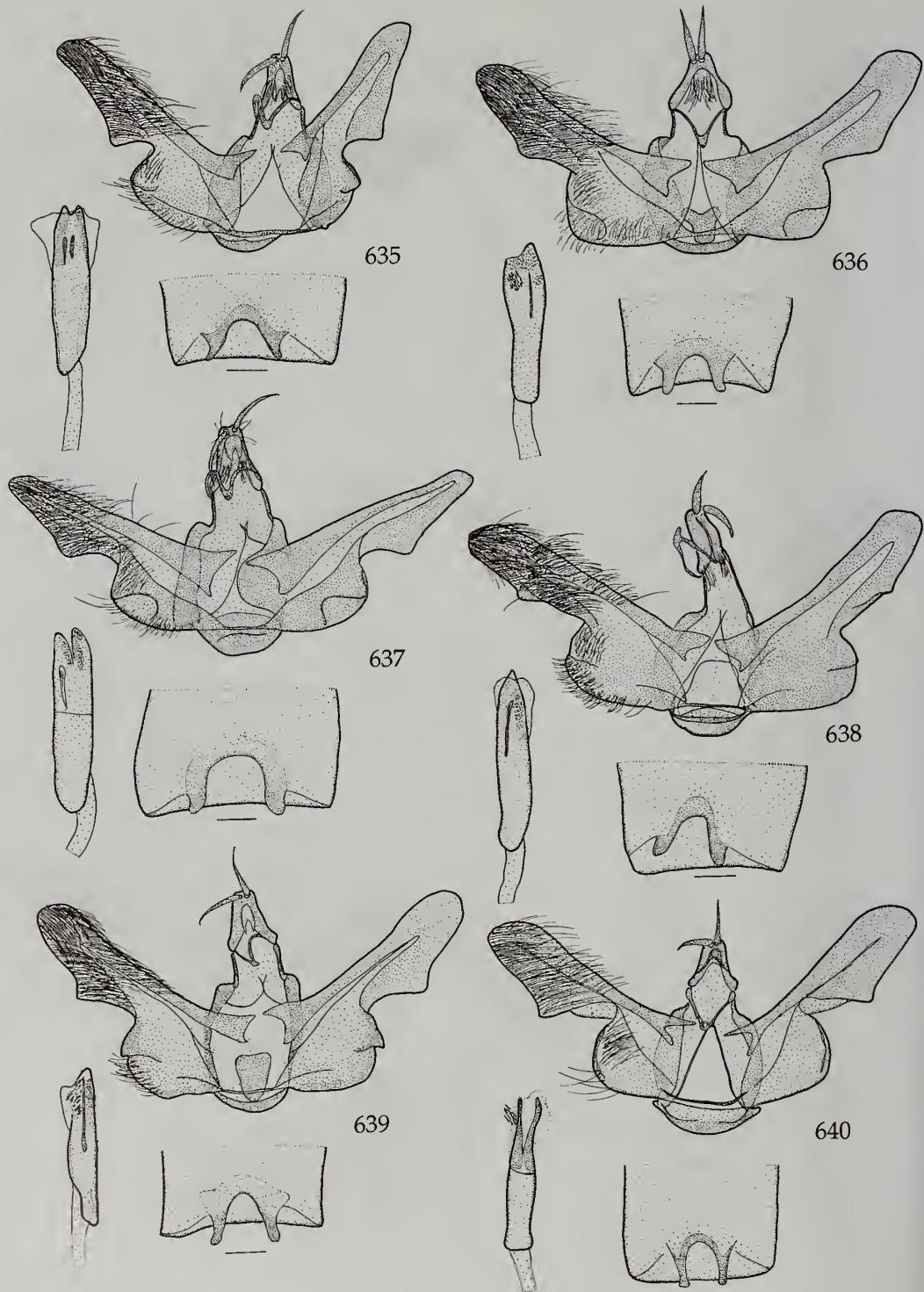
Figs 617–622. Male genitalia. 617, *Chiasmia nobilitata* (Prout); 618, *C. infabricata* (Prout); 619, *C. adelpha* sp. n.; 620, *C. nevilledukei* sp. n.; 621, *C. trirecurva* (Saalmüller); 622, *C. confuscata* (Warren). Scale-bar = 0.3 mm.



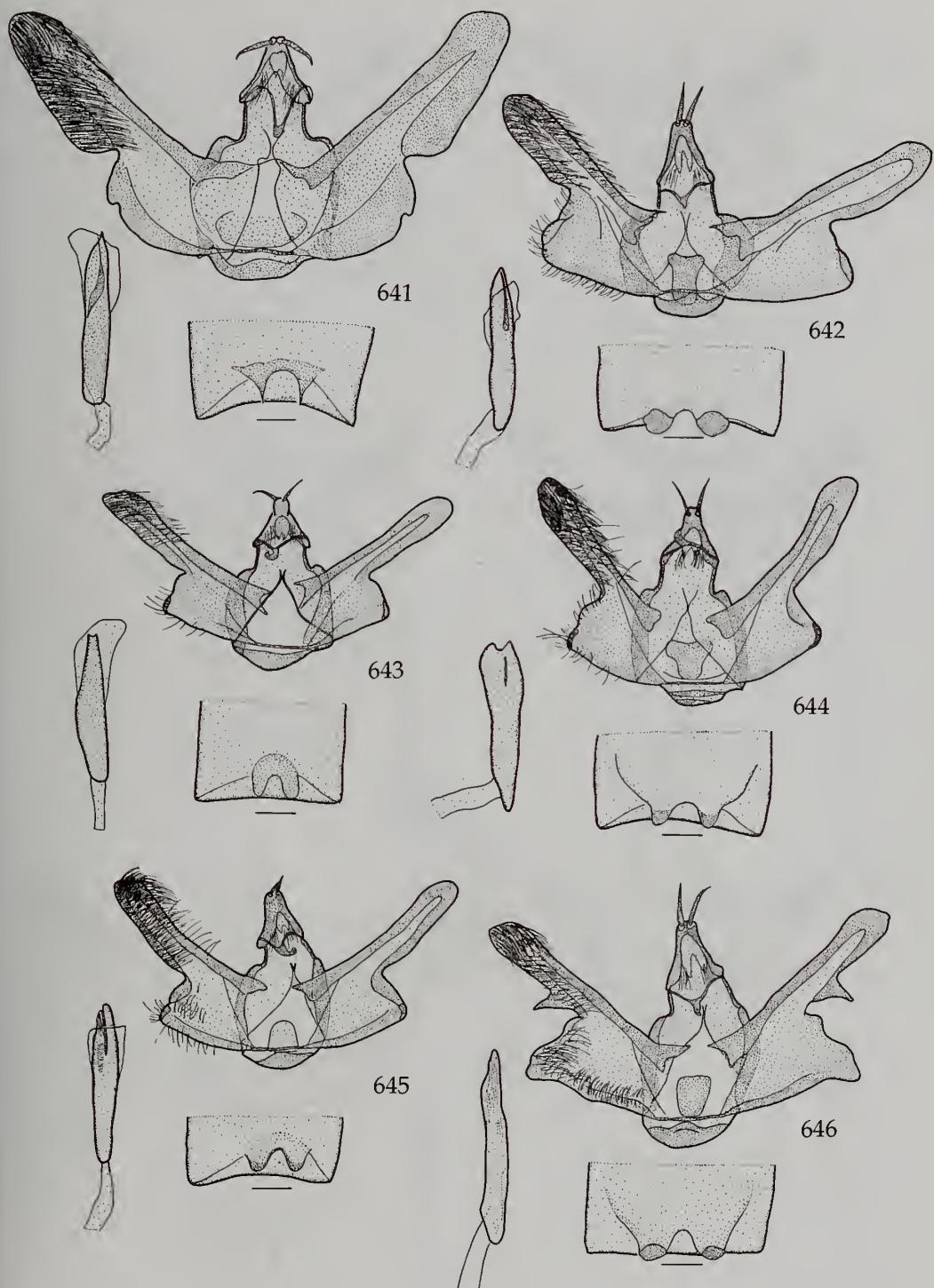
Figs 623–628. Male genitalia. 623, *Chiasmia sororcula* (Warren); 624, *C. fuscataria* (Möschler); 625, *C. malgassofusca* sp. n.; 626, *C. flavicuneata* (Herbulot); 627, *C. s. separata* (Warren); 628, *C. livorosa* (Herbulot). Scale-bar = 0.3 mm.



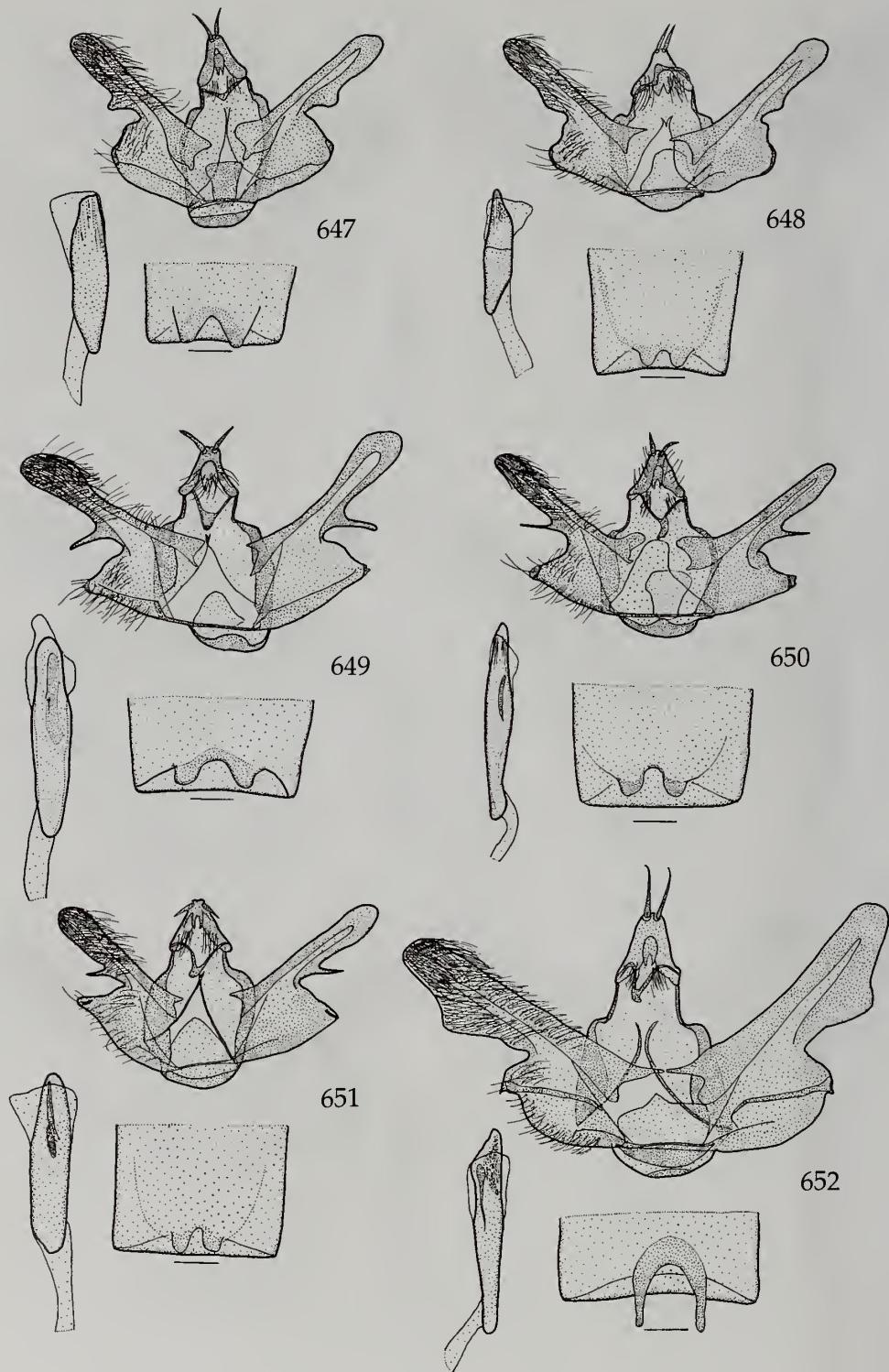
Figs 629–634. Male genitalia. 629, *Chiasmia neolivorosa* sp. n.; 630, *C. parallacta* (Warren); 631, *C. paucimacula* sp. n.; 632, *C. phaeostigma* (Fletcher); 633, *C. natalensis* (Warren); 634, *C. coronoleucas* (Herbulot). Scale-bar = 0.3 mm.



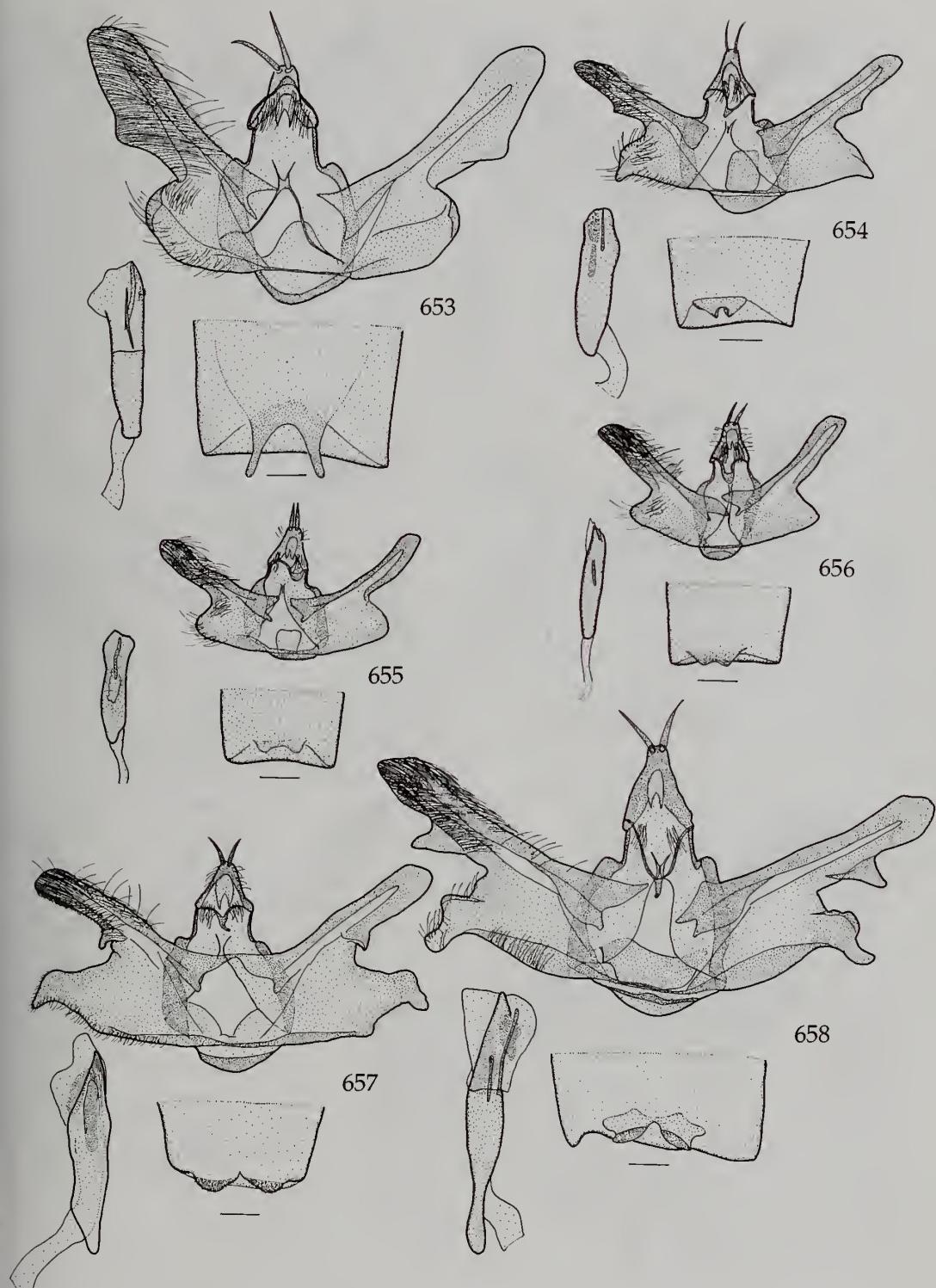
Figs 635–640. Male genitalia. 635, *Chiasmia fontainei* (Fletcher); 636, *C. threnopsis* (Fletcher); 637, *C. crumenata* (Fletcher); 638, *C. conturbata* (Warren); 639, *C. inquinata* sp. n.; 640, *C. insulicola* sp. n. Scale-bar = 0.3 mm.



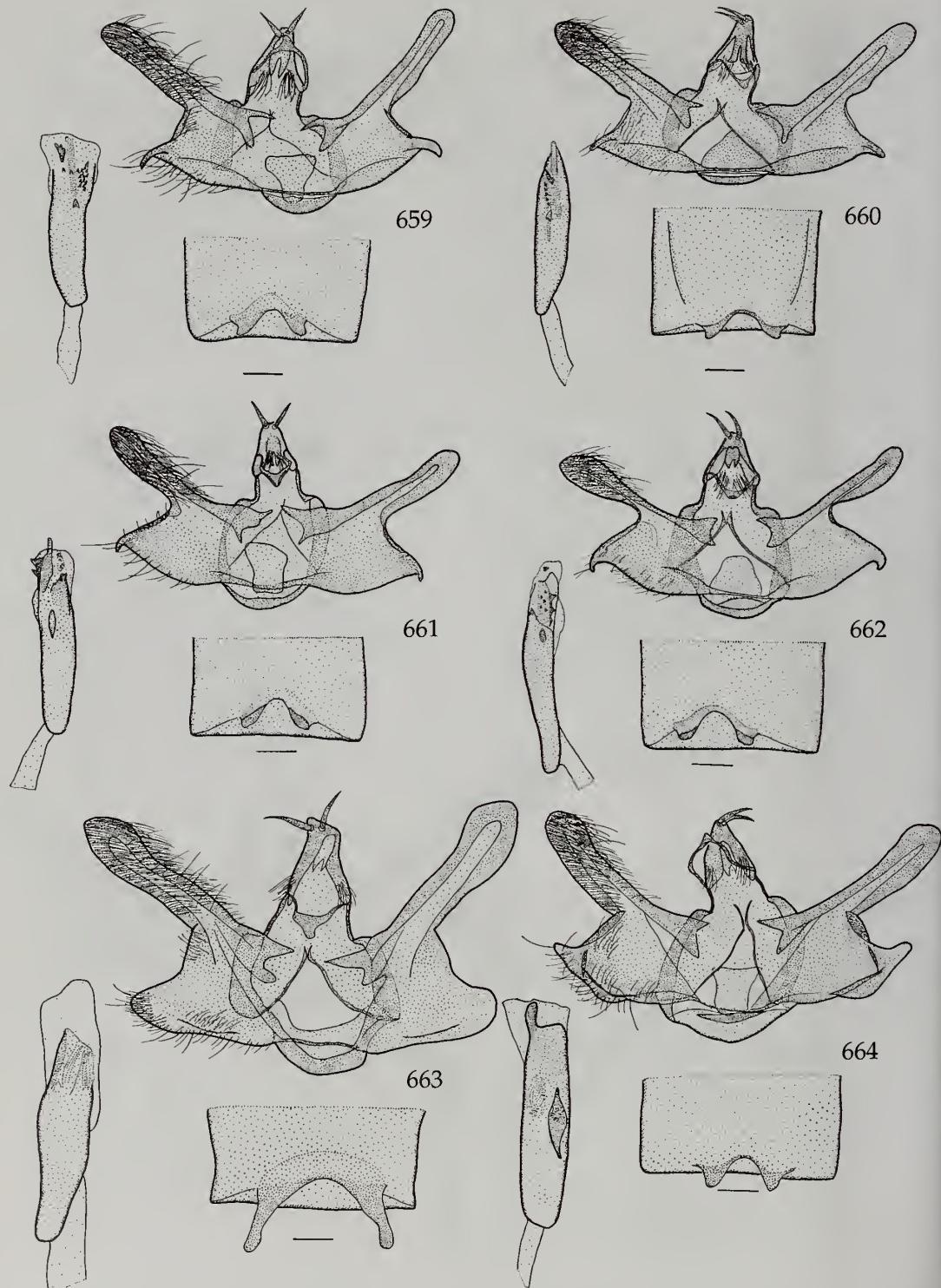
Figs 641–646. Male genitalia. 641, *Chiasmia feraliata* (Guenée); 642, *C. a. amarata* (Guenée); 643, *C. acutiapex* sp. n.; 644, *C. simplex* sp. n.; 645, *C. cararia* (Swinhoe); 646, *C. deceptrix* sp. n. Scale-bar = 0.3 mm.



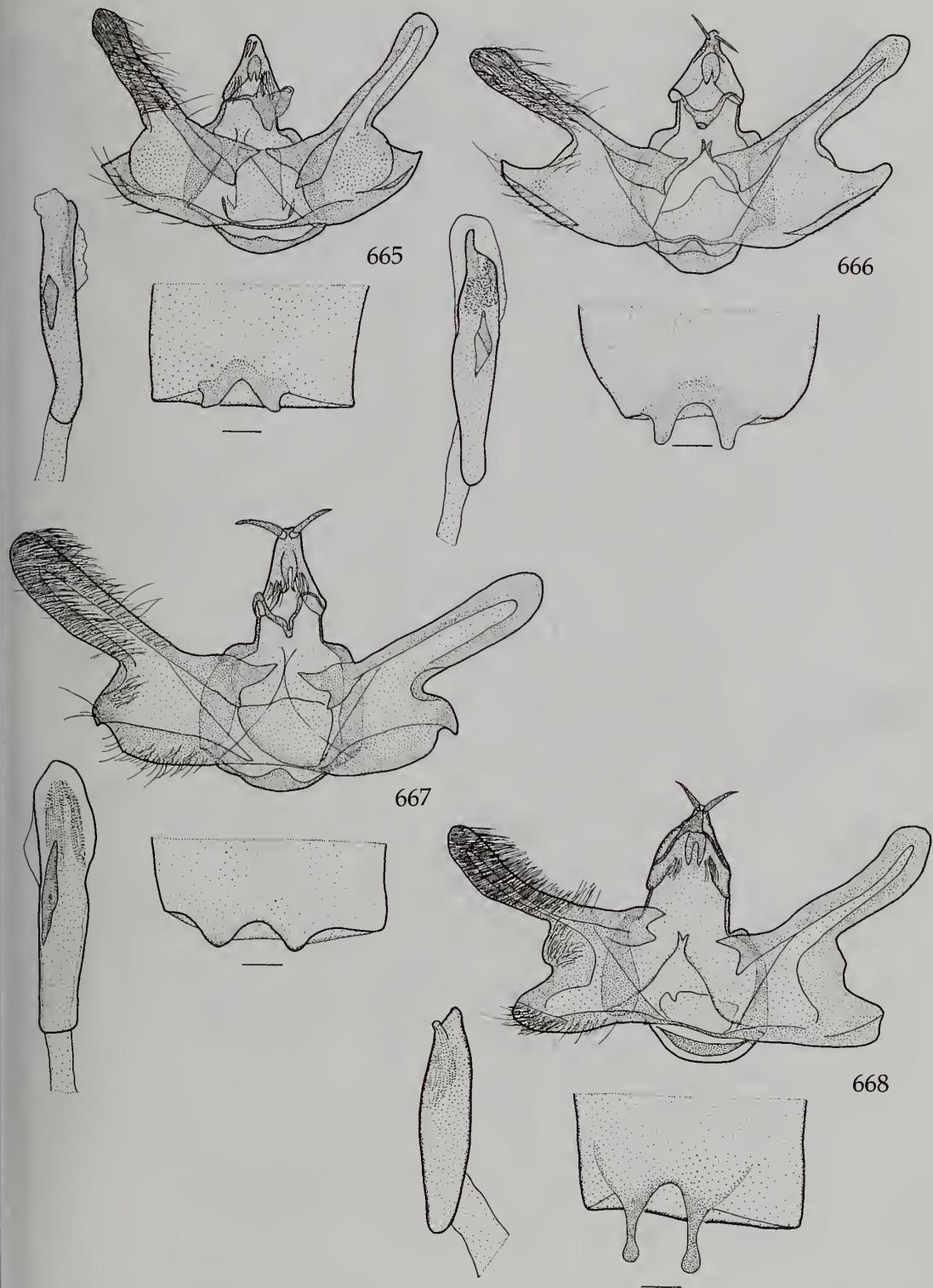
Figs 647–652. Male genitalia. 647, *Chiasmia duplicitinea* (Warren); 648, *C. megalesia* (Viette); 649, *C. unigeminata* (Prout); 650, *C. costiguttata* (Warren); 651, *C. kenyae* sp. n.; 652, *C. orientalis* sp. n. Scale-bar = 0.3 mm.



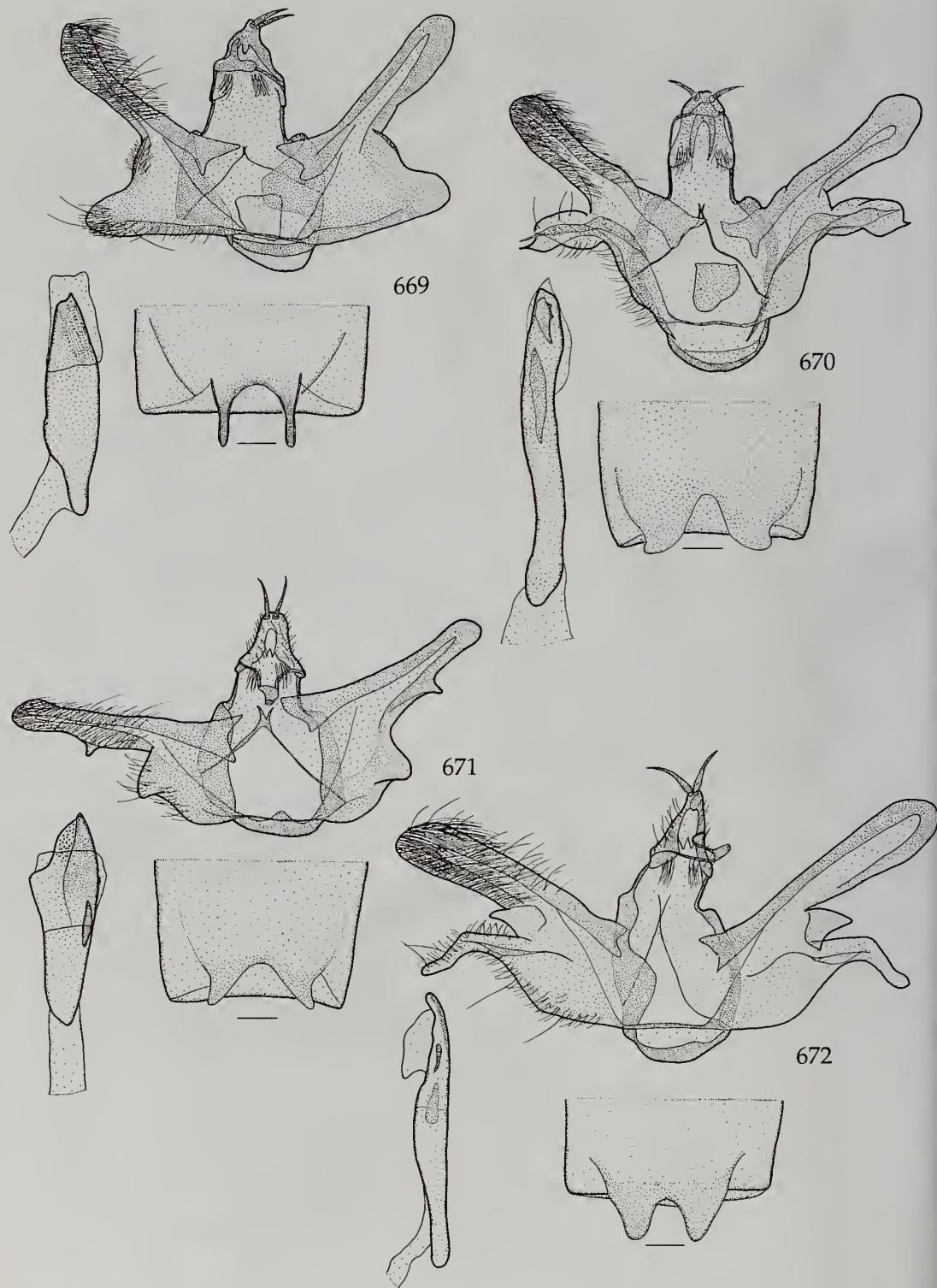
Figs 653–658. Male genitalia. 653, *Chiasmia trigonoleuca* (Herbulot); 654, *C. plutocrypsis* (Herbulot); 655, *C. angolae* (Bethune-Baker); 656, *C. subcretata* (Warren); 657, *C. geminilinea* (Prout); 658, *C. subvaria* (Bastelberger). Scale-bar = 0.3 mm.



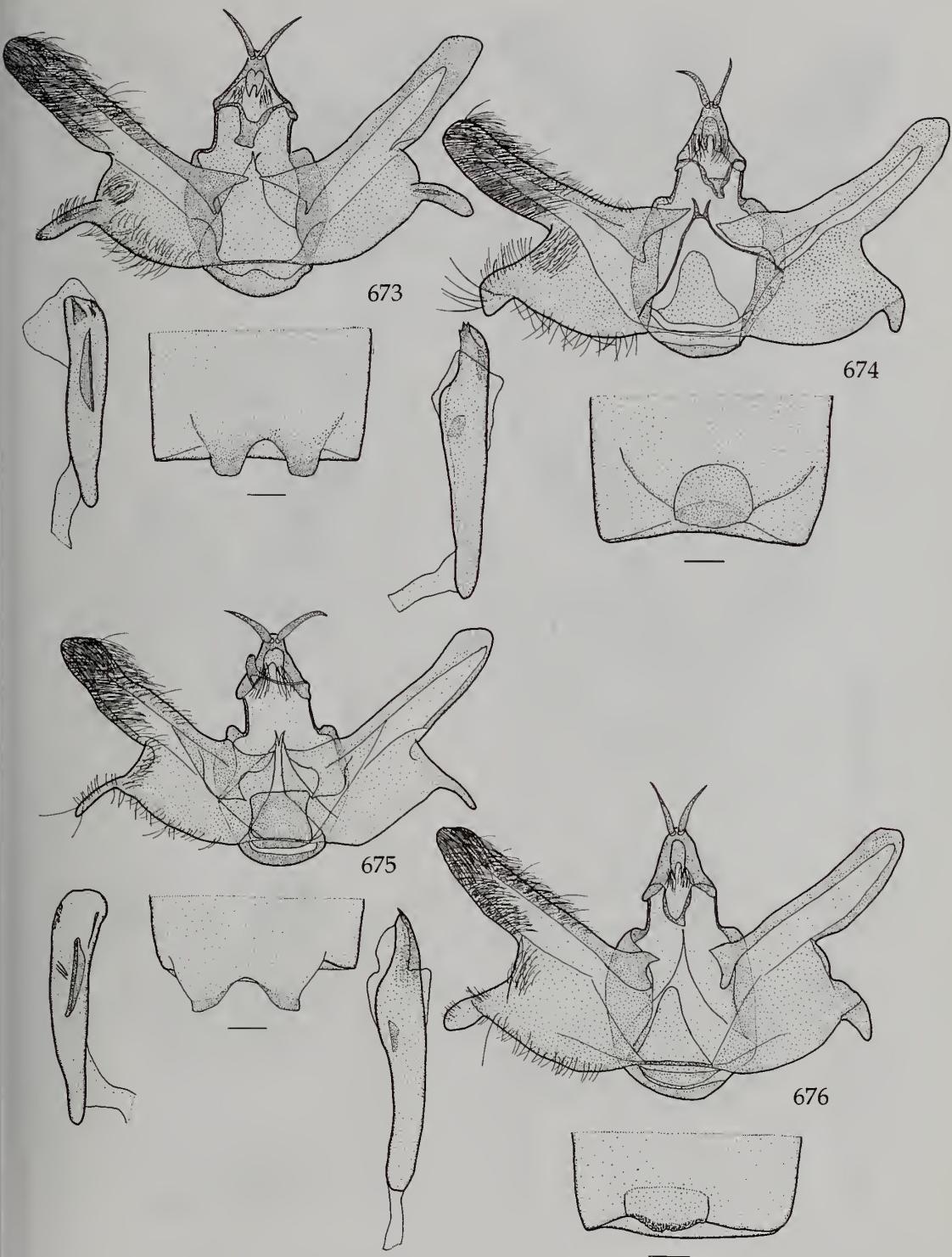
Figs 659–664. Male genitalia. 659, *Chiasmia aestimaria* (Hübner); 660, *C. sareptanaria* (Staudinger); 661, *C. syriacaria* (Staudinger); 662, *C. tenuata* (Staudinger); 663, *C. s. streniata* (Guenée); 664, *C. herbuloti* (Viette). Scale-bar = 0.3 mm.



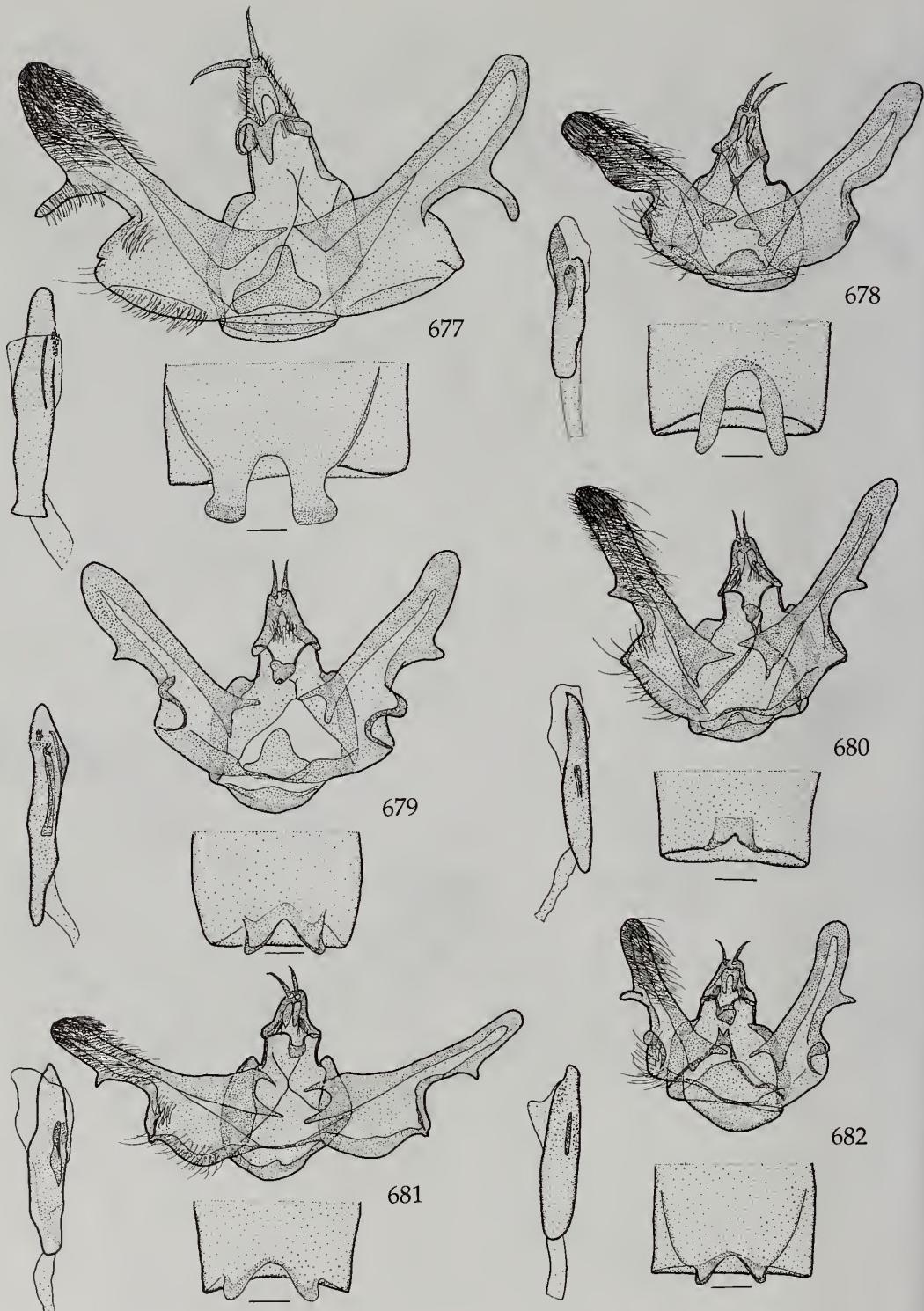
Figs 665–668. Male genitalia. 665, *Chiasmia hypactinia* (Prout); 666, *C. tsaratanana* (Viette); 667, *C. tetragraphicata* (Saalmüller); 668, *C. angolaria* (Snellen). Scale-bar = 0.3 mm.



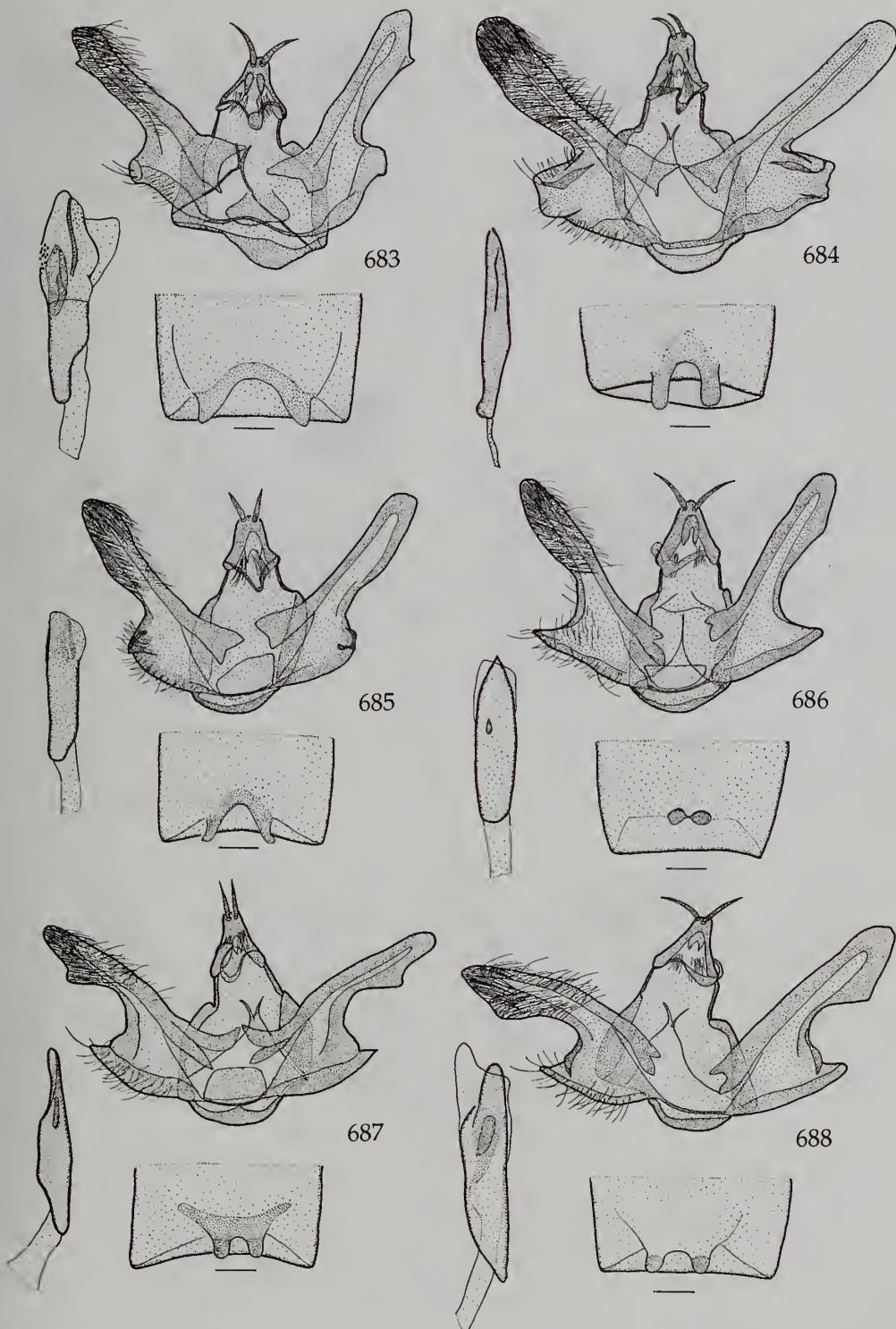
Figs 669–672. Male genitalia. 669, *Chiasmia parastreniata* sp. n.; 670, *C. buettikeri* (Wiltshire); 671, *C. collaxata* (Herbulot); 672, *C. ostentosaria* (Möschler). Scale-bar = 0.3 mm.



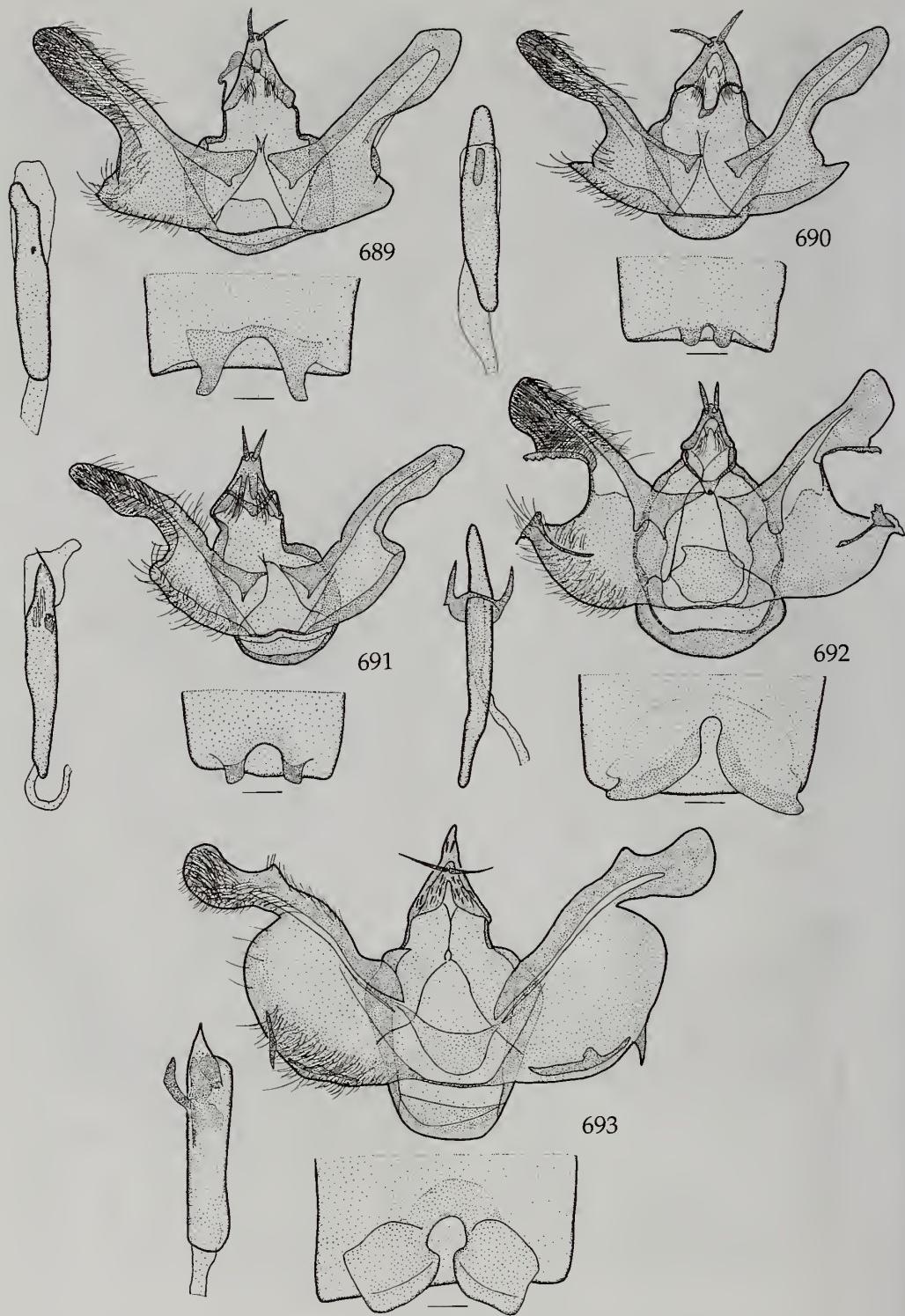
Figs 673–676. Male genitalia. 673, *Chiasmia impar* (Warren); 674, *C. grandis* sp. n.; 675, *C. pernoptera* (Prout); 676, *C. albivia* (Prout). Scale-bar = 0.3 mm.



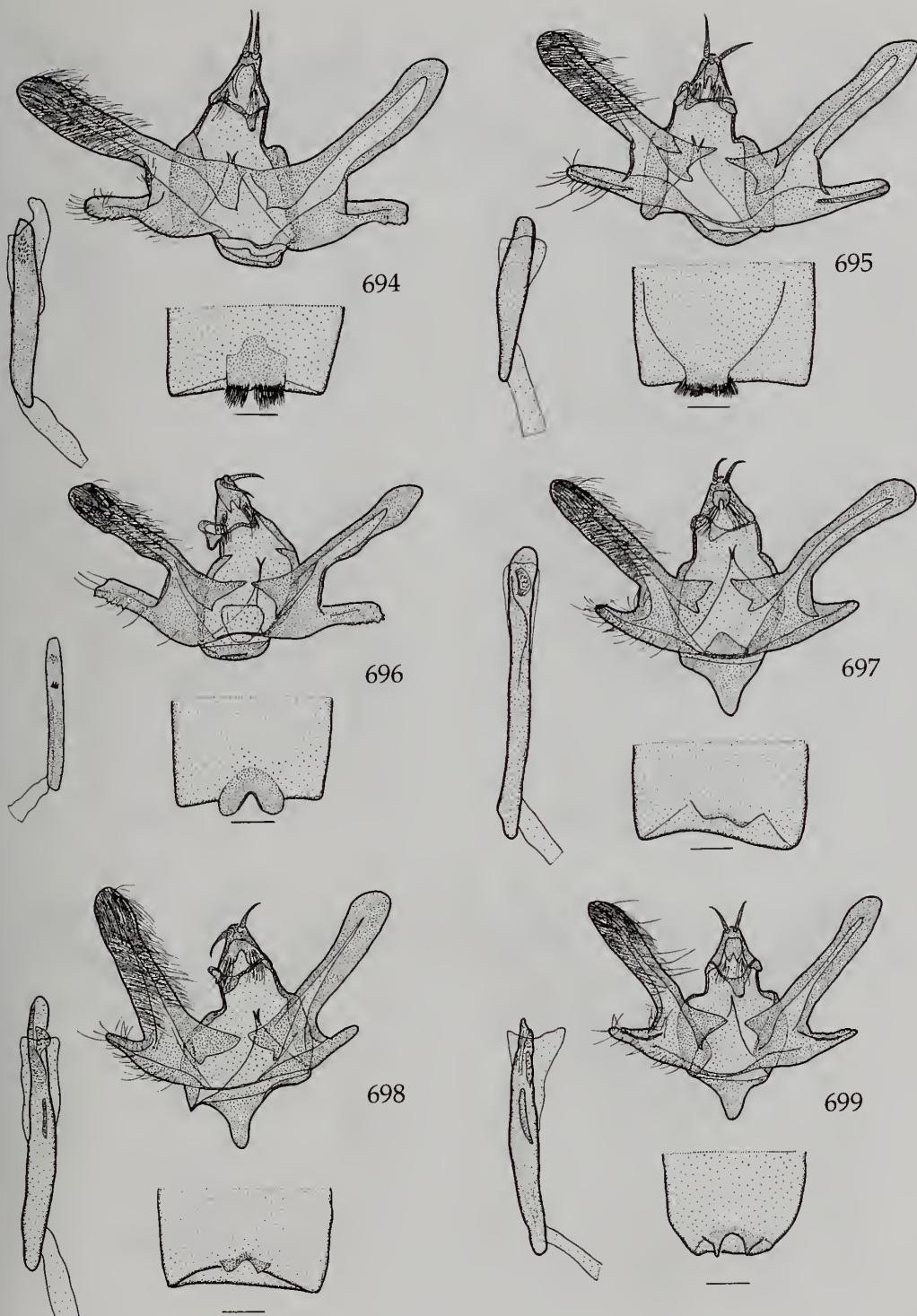
Figs 677–682. Male genitalia. 677, *Chiasmia fitzgeraldi* (Carcasson); 678, *C. crassilembaria* (Mabille); 679, *C. peremarginata* sp. n.; 680, *C. u. umbrata* (Warren); 681, *C. maronga* sp. n.; 682, *C. aureobrunnea* sp. n. Scale-bar = 0.3 mm.



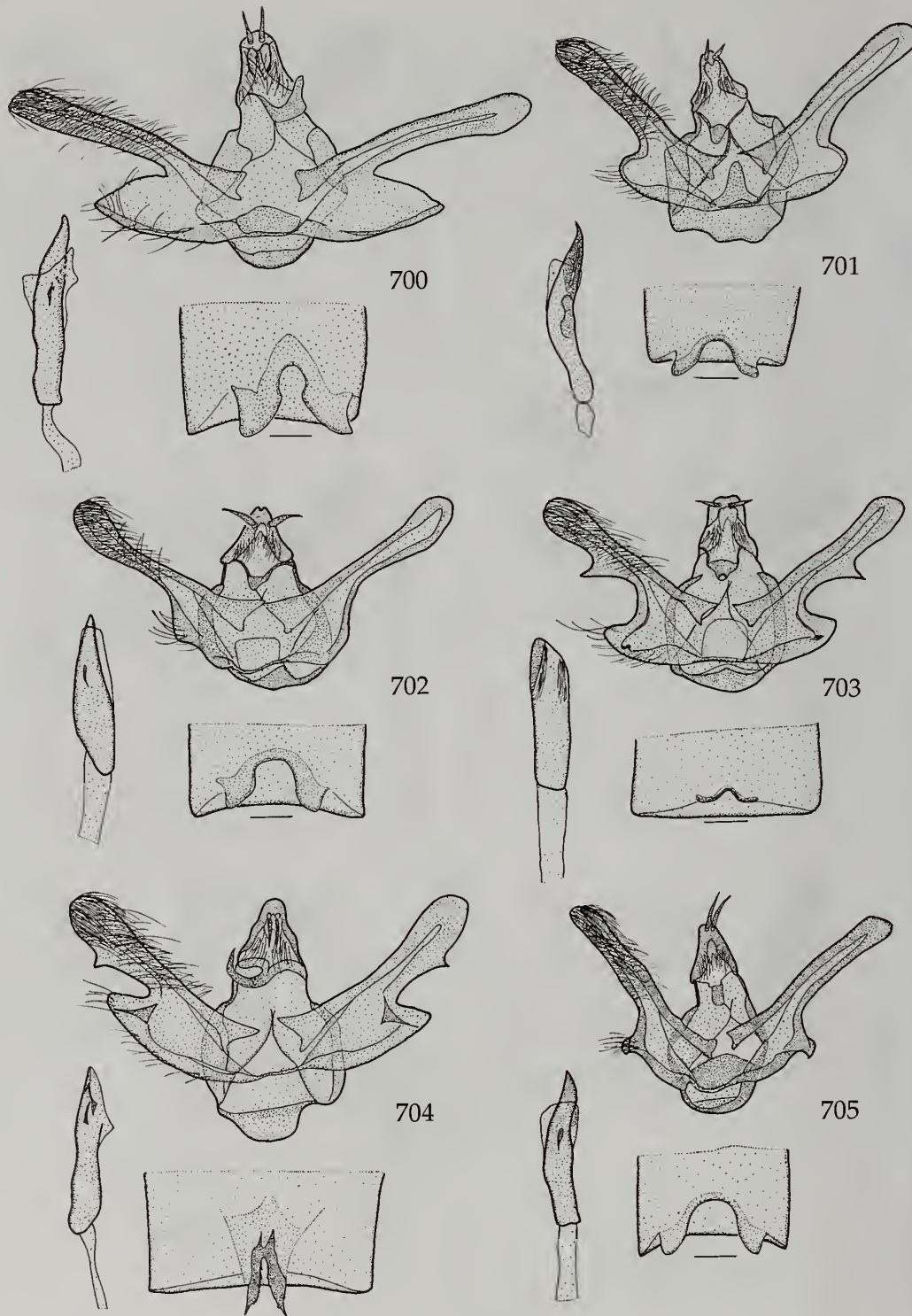
Figs 683–688. Male genitalia. 683, *Chiasmia i. inouei* (Herbulot); 684, *C. contaminata* (Warren); 685, *C. curvilineata* (Warren); 686, *C. austera* (Swinhoe); 687, *C. s. simplicilinea* (Warren); 688, *C. affinis* (Warren). Scale-bar = 0.3 mm.



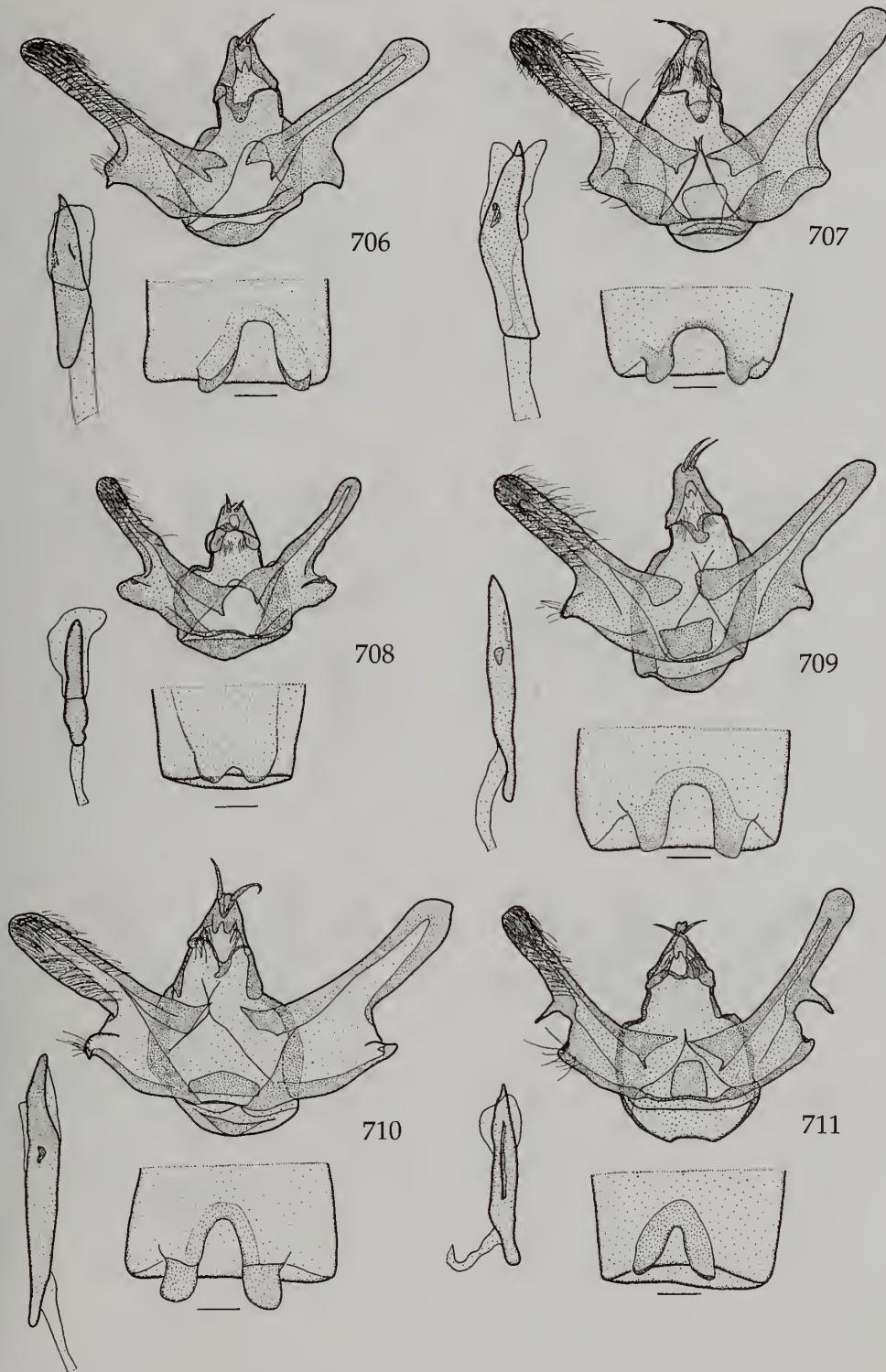
Figs 689–693. Male genitalia. 689, *Chiasmia fulvisparsa* (Warren); 690, *C. fulvimargo* (Warren); 691, *C. kilimanjarensis* (Holland); 692, *C. rectistriaria* (Herrich-Schäffer); 693, *C. m. majestica* (Warren). Scale-bar = 0.3 mm.



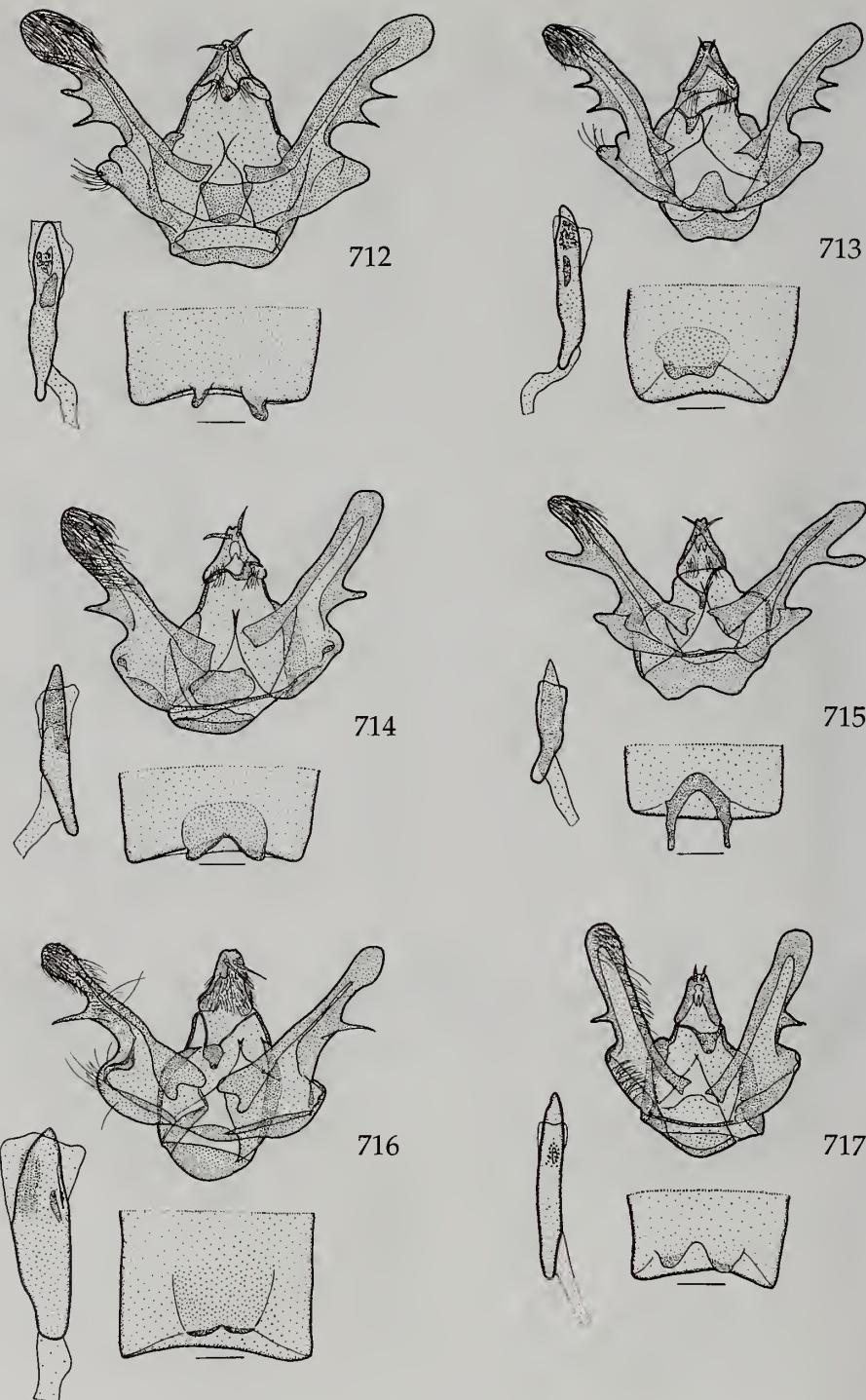
Figs 694–699. Male genitalia. 694, *Chiasmia m. multistrigata* (Warren); 695, *C. improcera* (Herbulot); 696, *C. zobrysi* sp. n.; 697, *C. curvifascia* (Warren); 698, *C. boarmioides* sp. n.; 699, *C. unifilata* (Warren). Scale-bar = 0.3 mm.



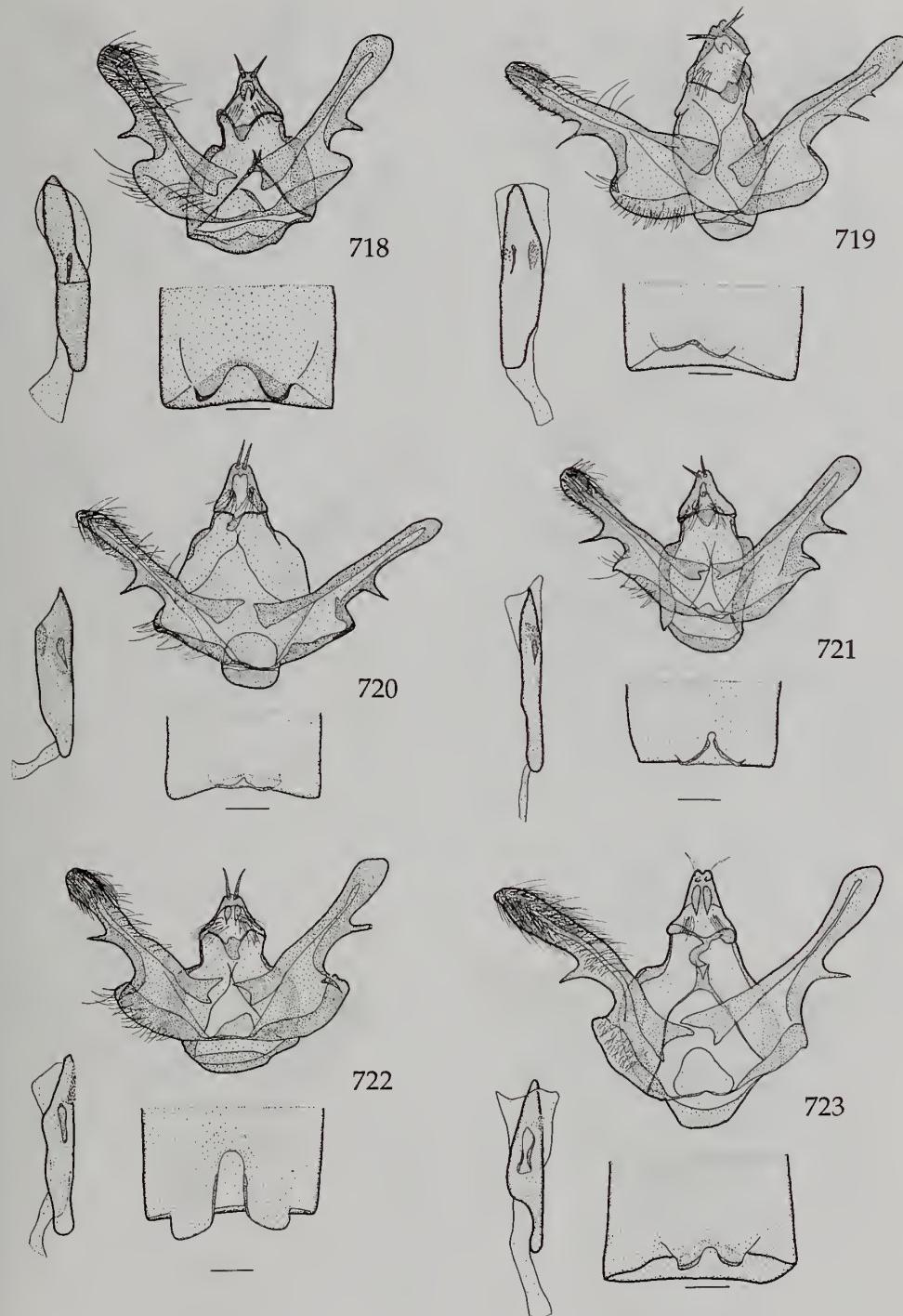
Figs 700–705. Male genitalia. 700, *Chiasmia turbulentata* (Guenée); 701, *C. procidata semispurcata* (Walker); 702, *C. latimarginaria* (Rebel); 703, *C. warreni* (Prout); 704, *C. pervittata* (Hampson); 705, *C. furcata* (Warren). Scale-bar = 0.3 mm.



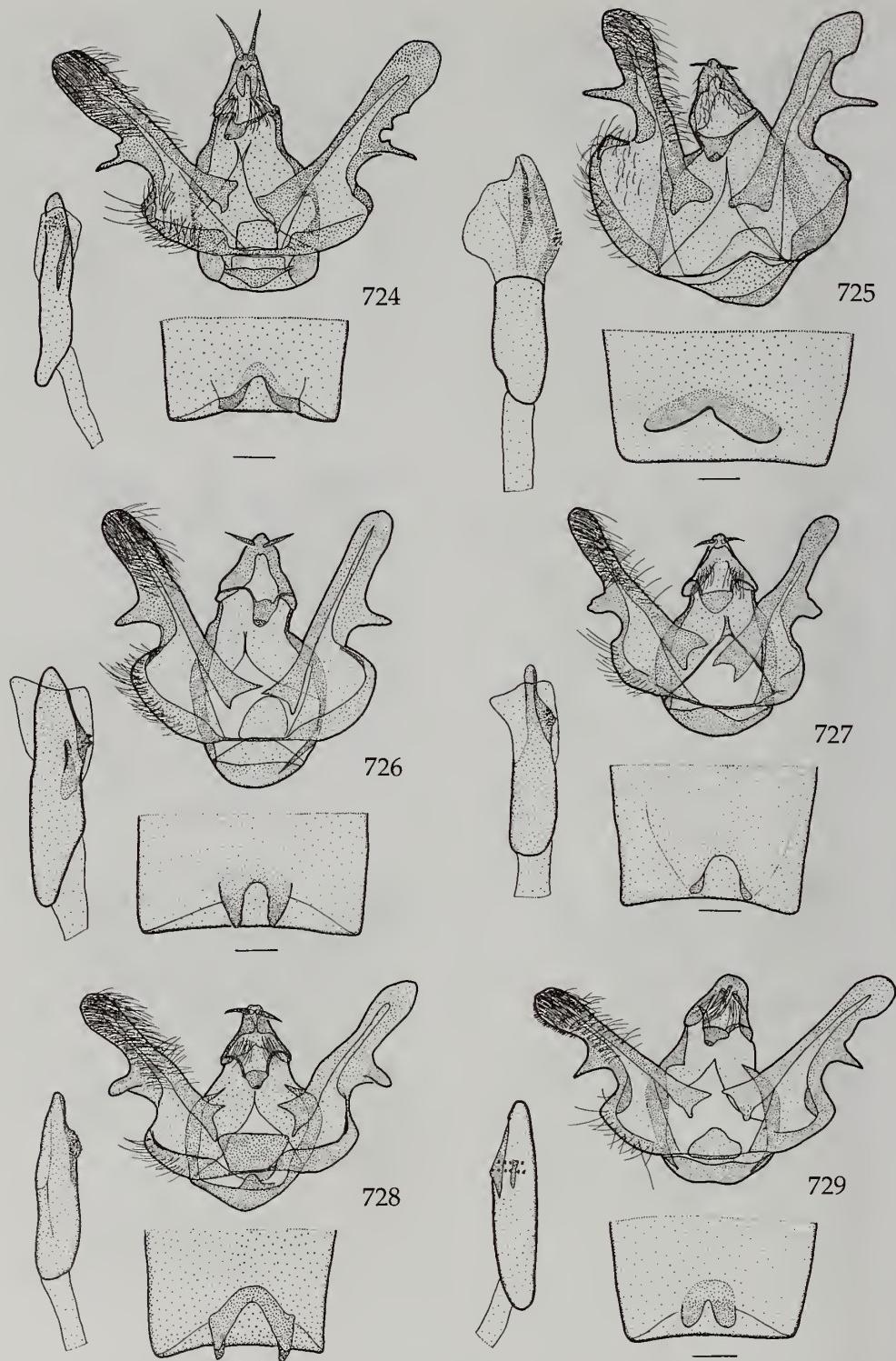
Figs 706–711. Male genitalia. 706, *Chiasmia i. inaequilinea* (Warren); 707, *C. butaria* (Swinhoe); 708, *C. grimmia* (Wallengren); 709, *C. observata* (Walker); 710, *C. s. subcurvaria* (Mabille); 711, *C. kirbyi* (Wallengren). Scale-bar = 0.3 mm.



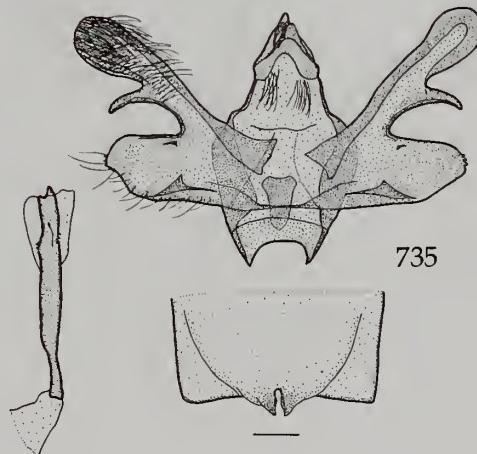
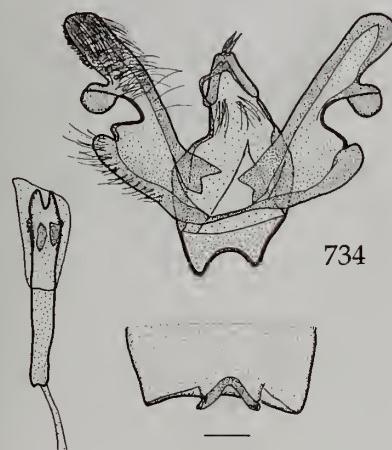
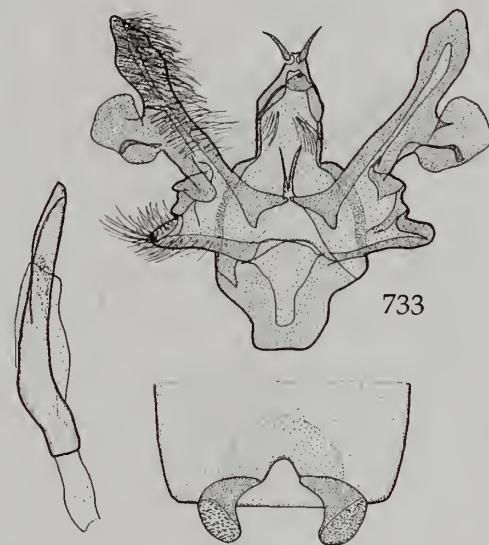
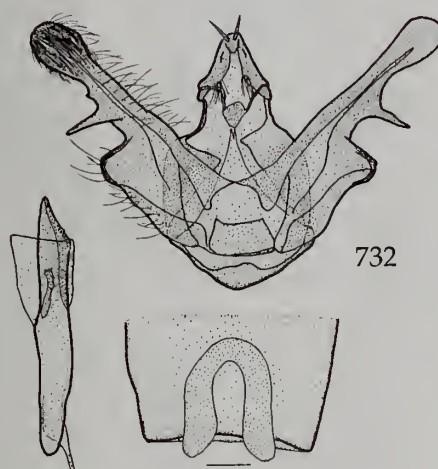
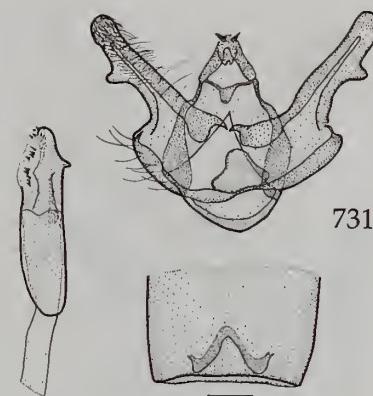
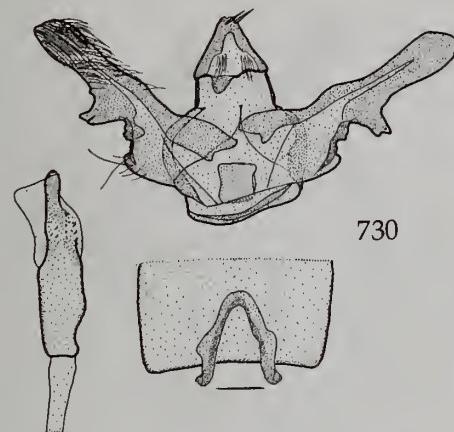
Figs 712–717. Male genitalia. 712, *Chiasmia crassata* (Warren); 713, *C. punctilinea* (Prout); 714, *C. dentilineata* (Warren); 715, *C. costicommata* (Prout); 716, *C. b. brongusaria* (Walker); 717, *C. sudanata* (Warren & Rothschild). Scale-bar = 0.3 mm.



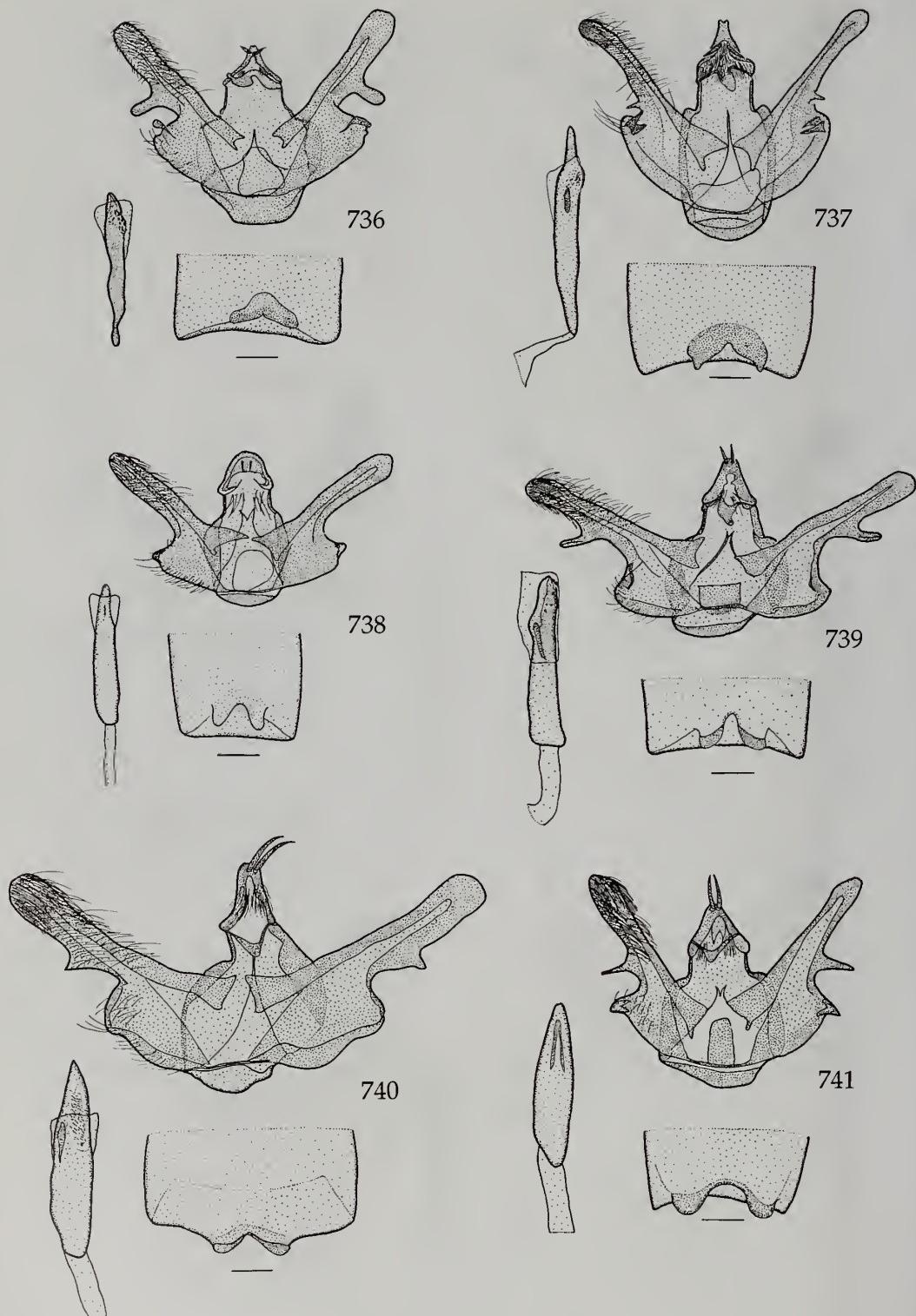
Figs 718–723. Male genitalia. 718, *Chiasmia senegambiensis* sp. n.; 719, *C. tristis* sp. n.; 720, *C. castanea* sp. n.; 721, *C. inconspicua* (Warren); 722, *C. assimilis* (Warren); 723, *C. maculosa* (Warren). Scale-bar = 0.3 mm.



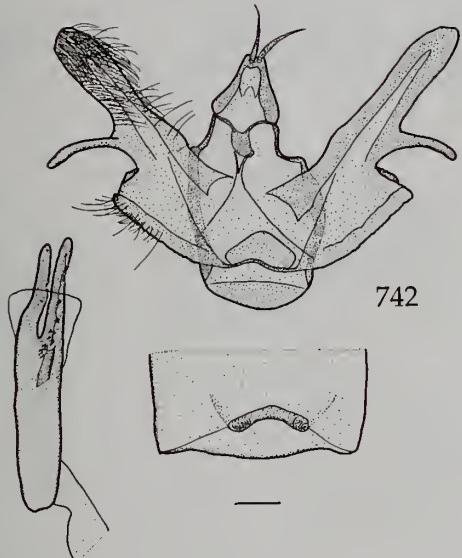
Figs 724–729. Male genitalia. 724, *Chiasmia ammodes* (Prout); 725, *C. olindaria* (Swinhoe); 726, *C. suriens* (Strand); 727, *C. danmariae* sp. n.; 728, *C. sangueresara* sp. n.; 729, *C. soror* sp. n. Scale-bar = 0.3 mm.



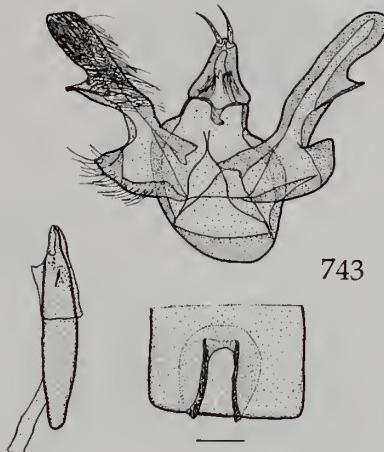
Figs 730–735. Male genitalia. 730, *Chiasmia trizonaria* (Prout); 731, *C. clathrata clathrata* (Linnaeus); 732, *C. umbratilis* (Butler); 733, *C. marmorata* (Warren); 734, *C. semialbida* (Prout); 735, *C. obliquilineata* (Warren).



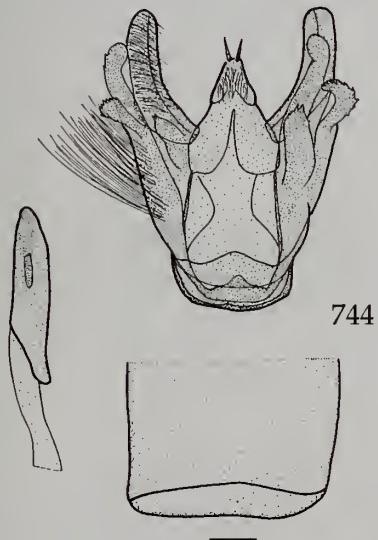
Figs 736-741. Male genitalia. 736, *Chiasmia interrupta* (Warren); 737, *C. abnormata* (Prout); 738, *C. anguifera* (Prout); 739, *C. arenosa* (Butler); 740, *C. getula* (Wallengren); 741, *C. gyliura* (Prout). Scale bar = 0.3 mm.



742

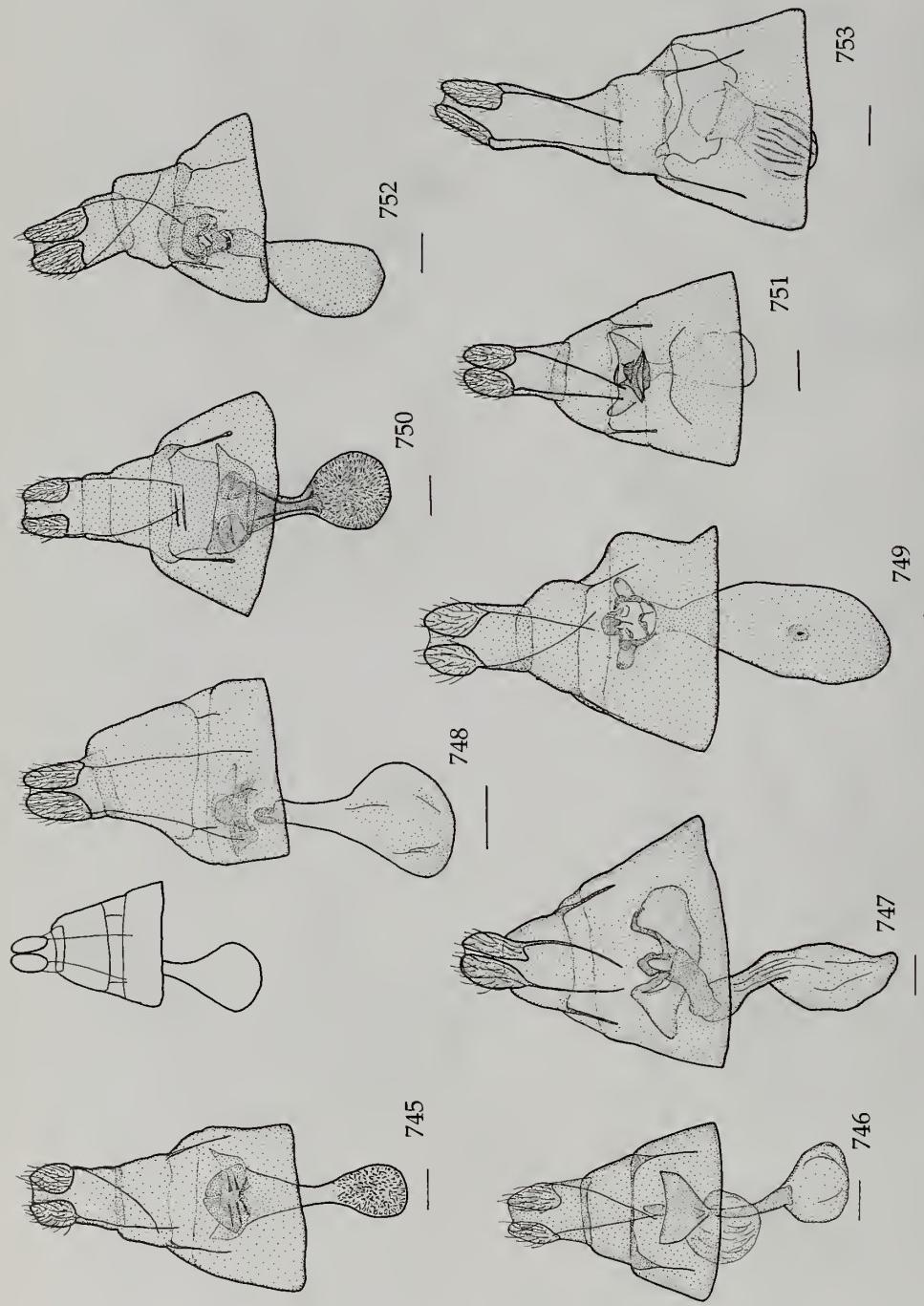


743

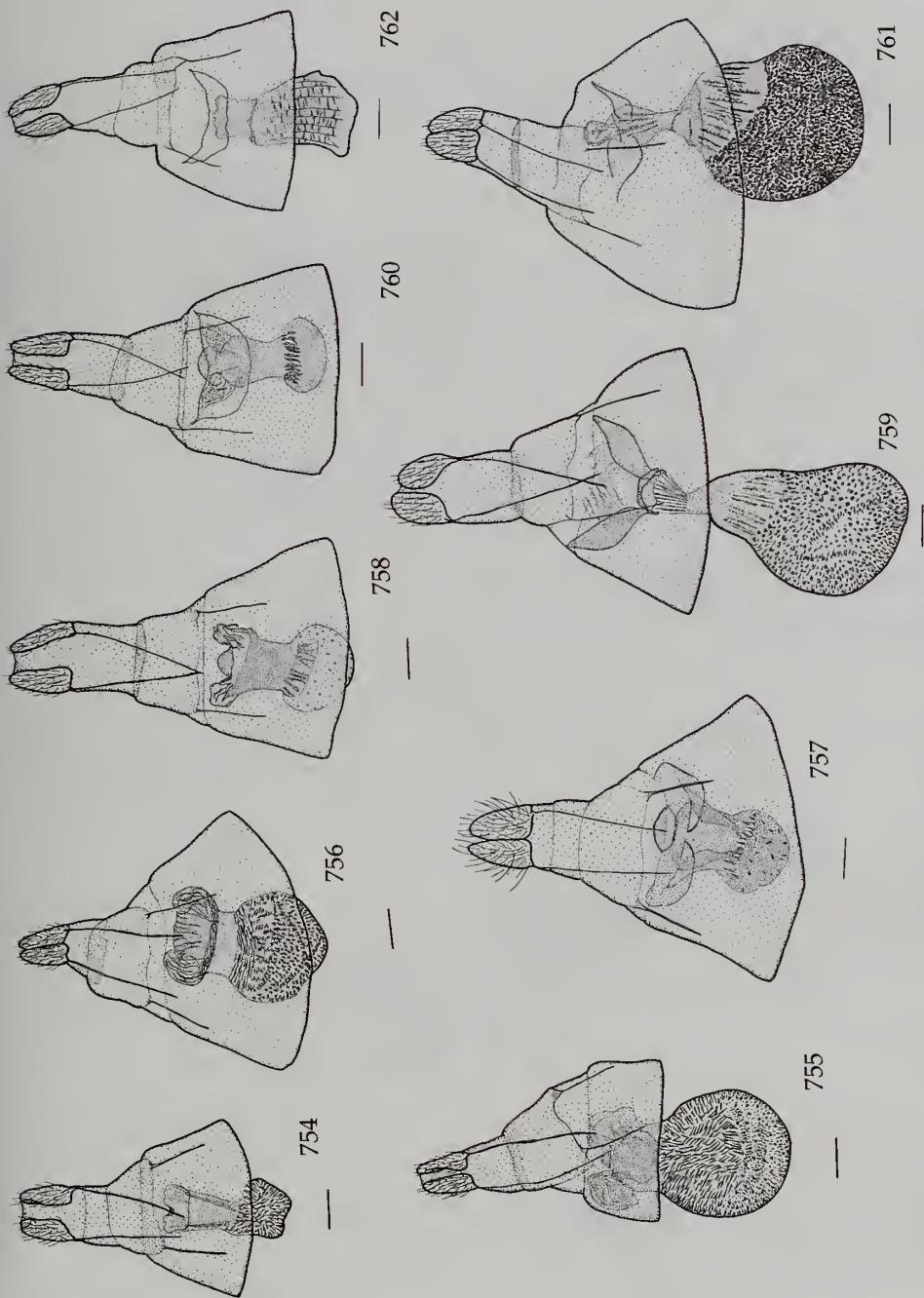


744

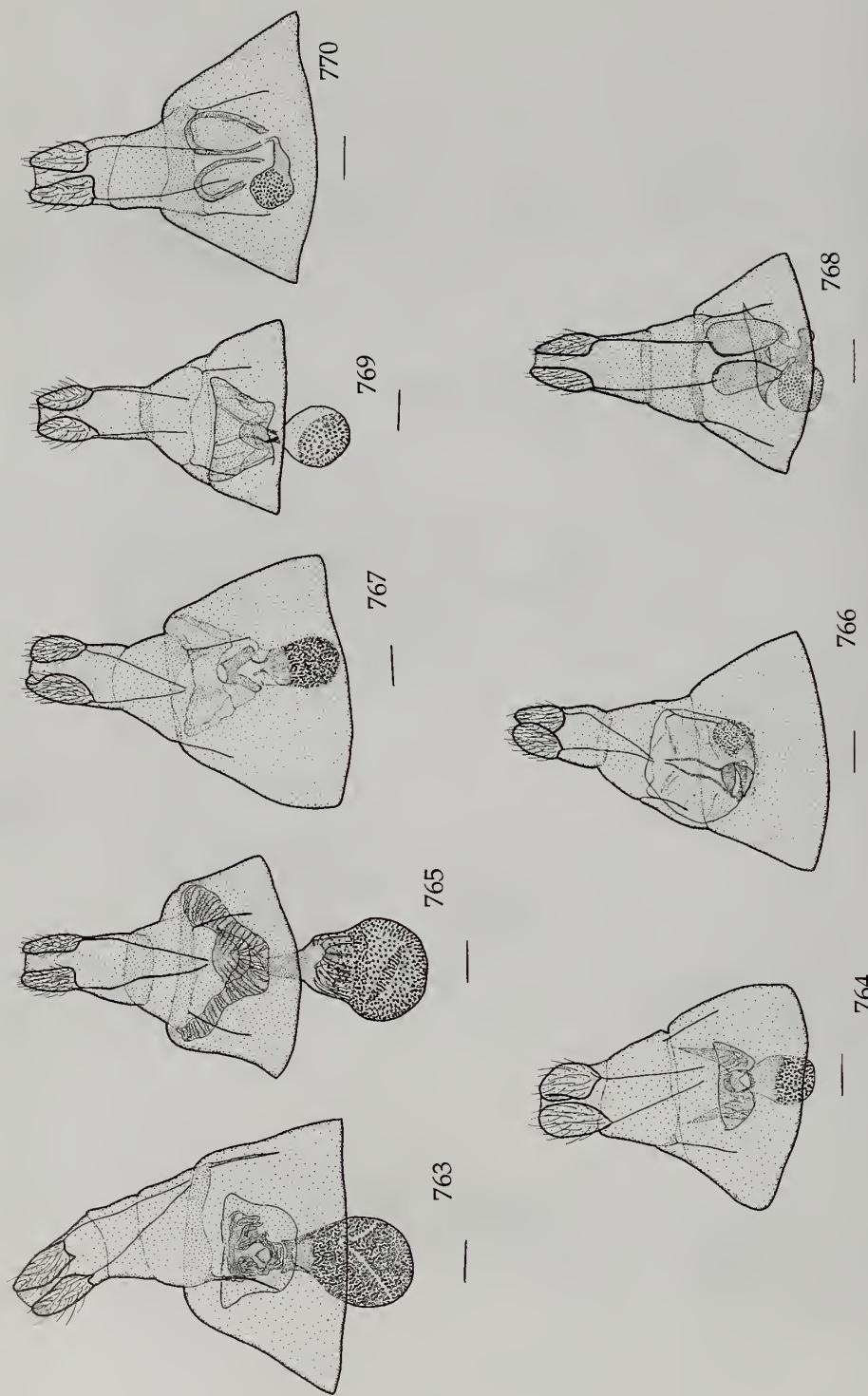
Figs 742–744. Male genitalia. 742, *Chiasmia nana* (Warren); 743, *C. normata* (Walker); 744, *Malgassothisa trifida* Herbulot. Scale-bar = 0.3 mm.



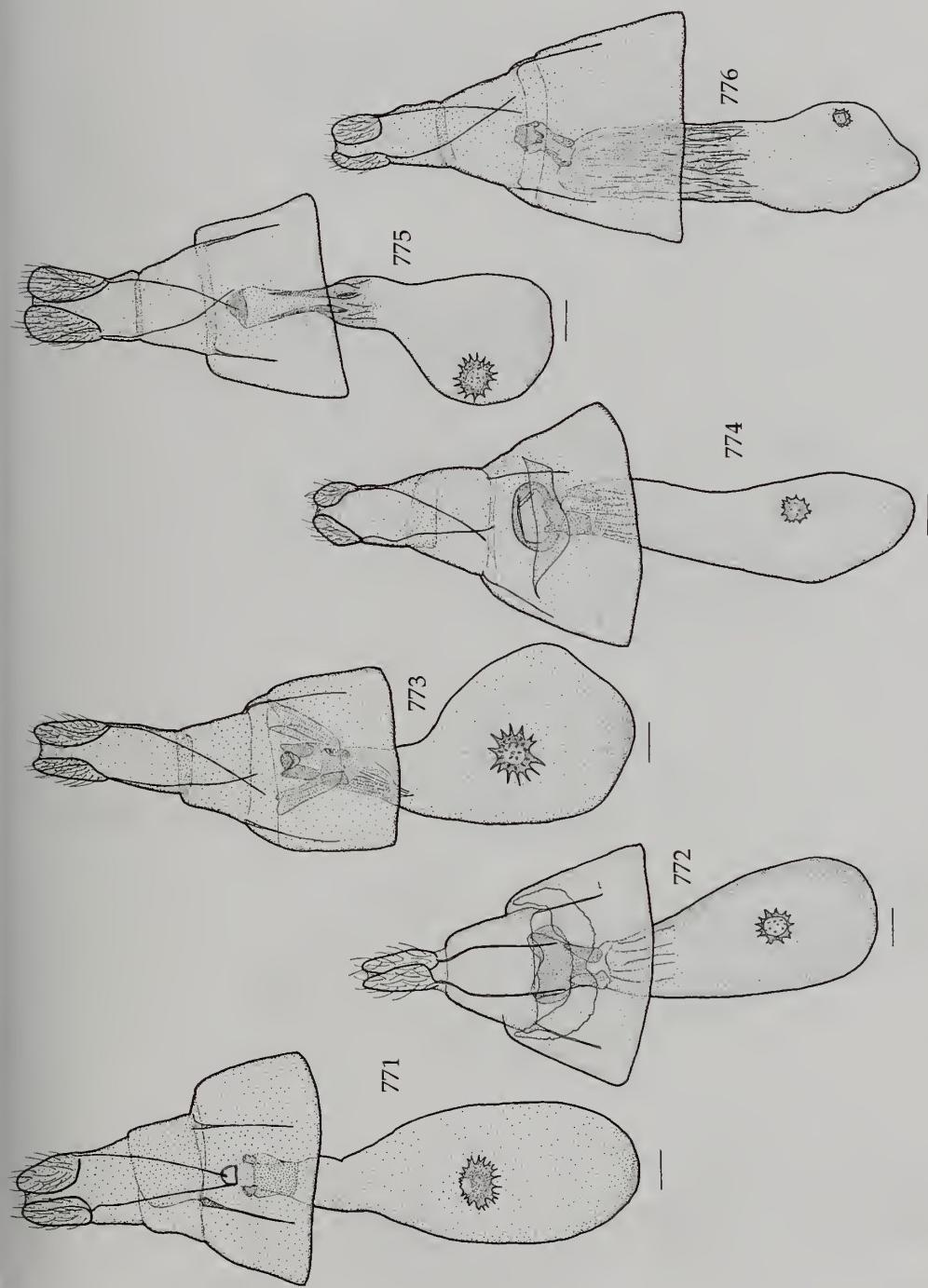
Figs 745-753. Female genitalia. 745, *Acanthovalva inconspicuaria* (Hübner); 746, *A. capensis* sp. n.; 747, *A. ireno* sp. n.; 748, *A. bilineata* (Warren); 749, *A. focularia* (Geyer); 750, *Narraga n. nelyae* (Rothschild); 751, *P. acrobelia* (Wallengren); 752, *Sphyrocosta madeussa* (Vieite); 753, *Milocera horaria* Swinhoe. Scale-bar = 0.3 mm.



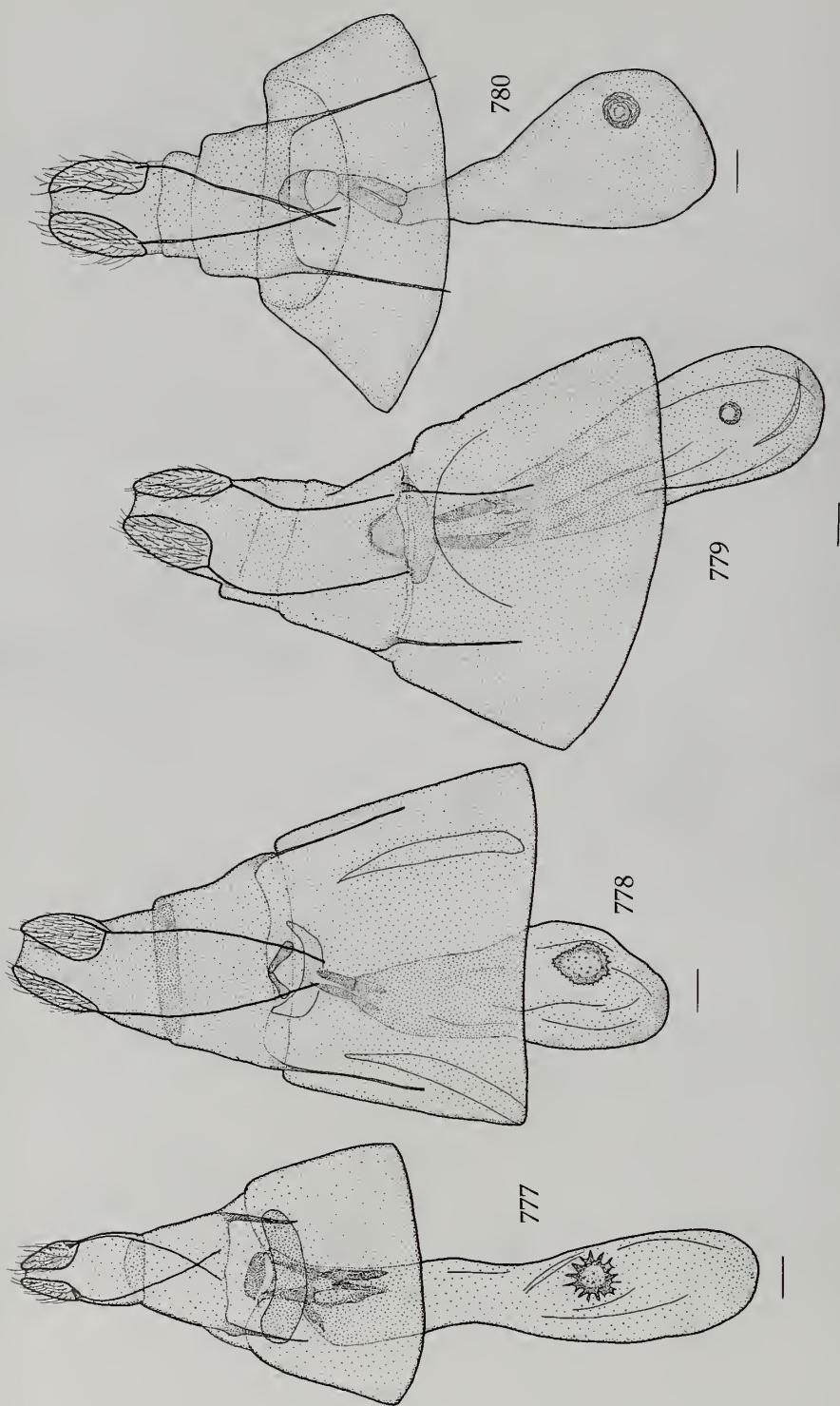
Figs 754-762. Female genitalia. 754, *Milocera eugompha* sp. n.; 755, *M. sexcornuta* sp. n.; 756, *M. ustatoides* sp. n.; 757, *M. diffusata* (Warren); 758, *M. ja* sp. n.; 759, *M. scoblei* sp. n.; 760, *M. aurora* sp. n.; 761, *M. arcifera* (Prout); 762, *M. diverse* Prout. Scale-bar = 0.3 mm.



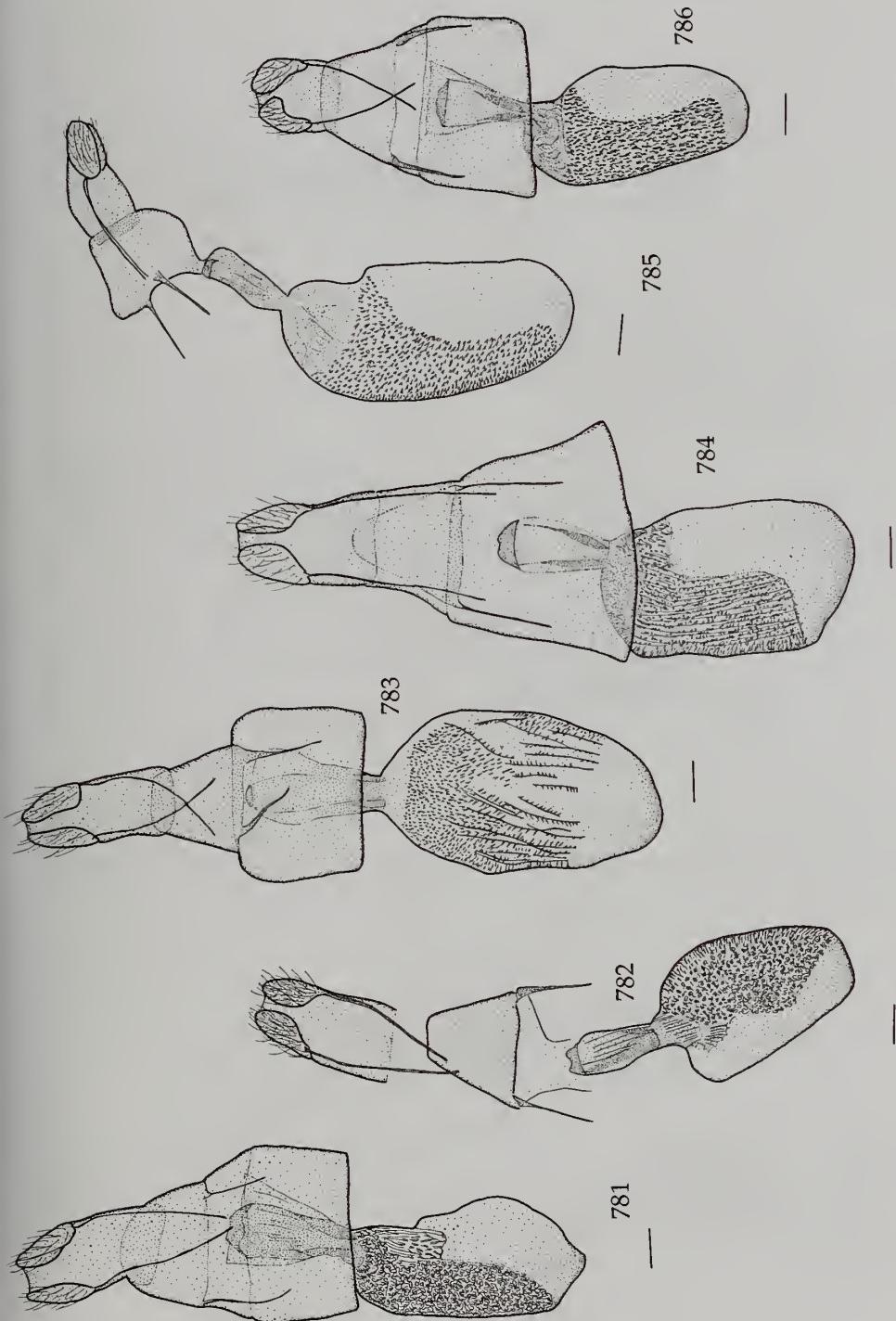
Figs 763-770. Female genitalia: 763, *Milocera dubia* (Pron); 764, *M. aureolitoralis* sp. n.; 765, *Platynocheila spurcata* (Warren); 766, *P. macilenta* sp. n.; 767, *P. griseobrunnea* sp. n.; 768, *P. flava* sp. n.; 769, *P. persubtilis* sp. n.; 770, *P. bullifera* sp. n. Scale-bar = 0.3 mm.



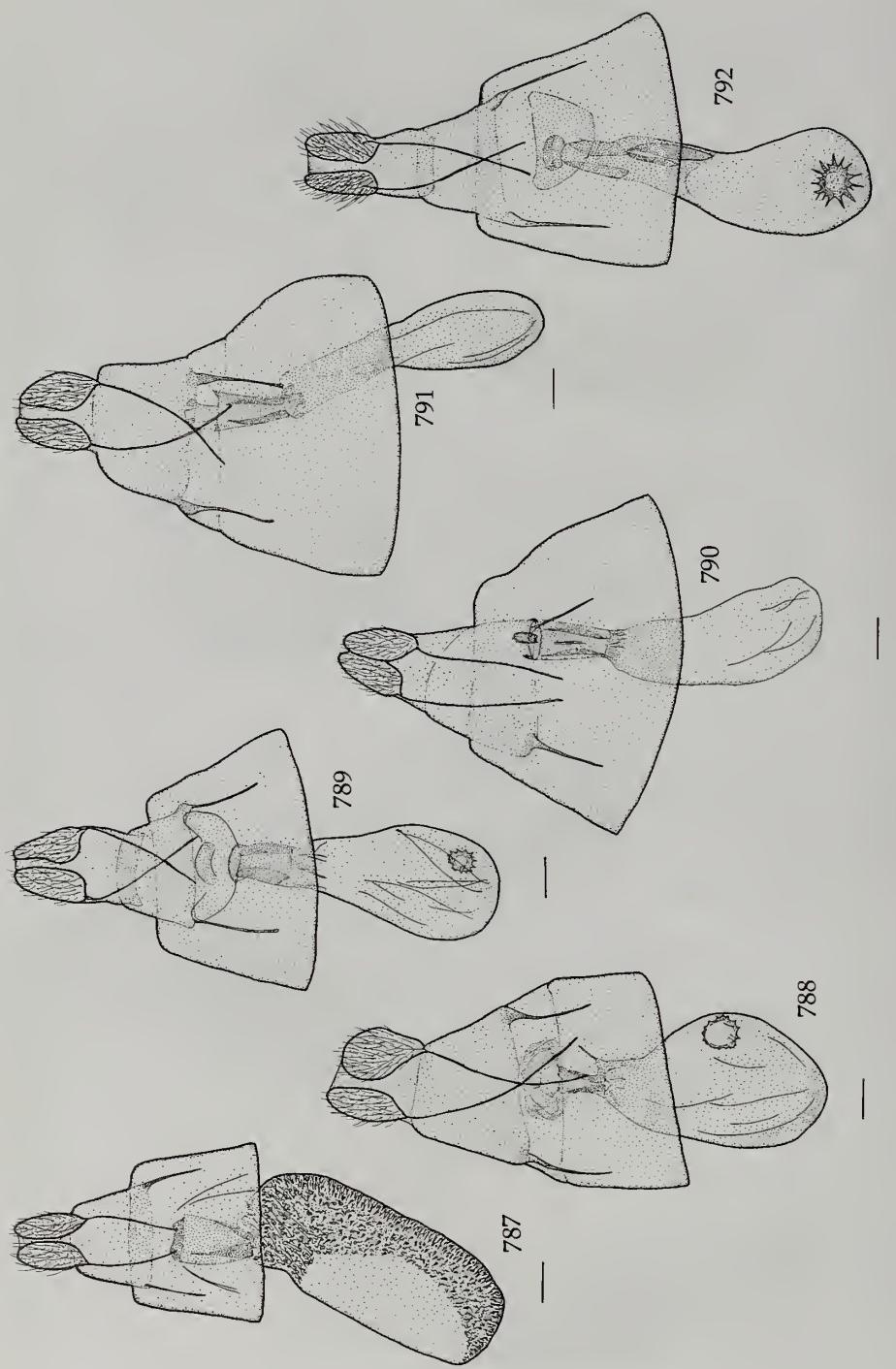
Figs 771-776. Female genitalia. 771, *Chelotephrina acorema* sp. n.; 772, *Tephritis murinaria* (D. & S.); 773, *Isturgia catalanaria* (Guenée); 774, *Isturgia triseriata* (Prout); 775, *I. univittaria* (Nabille); 776, *I. dukuduku* sp. n. Scale-bar = 0.3 mm.



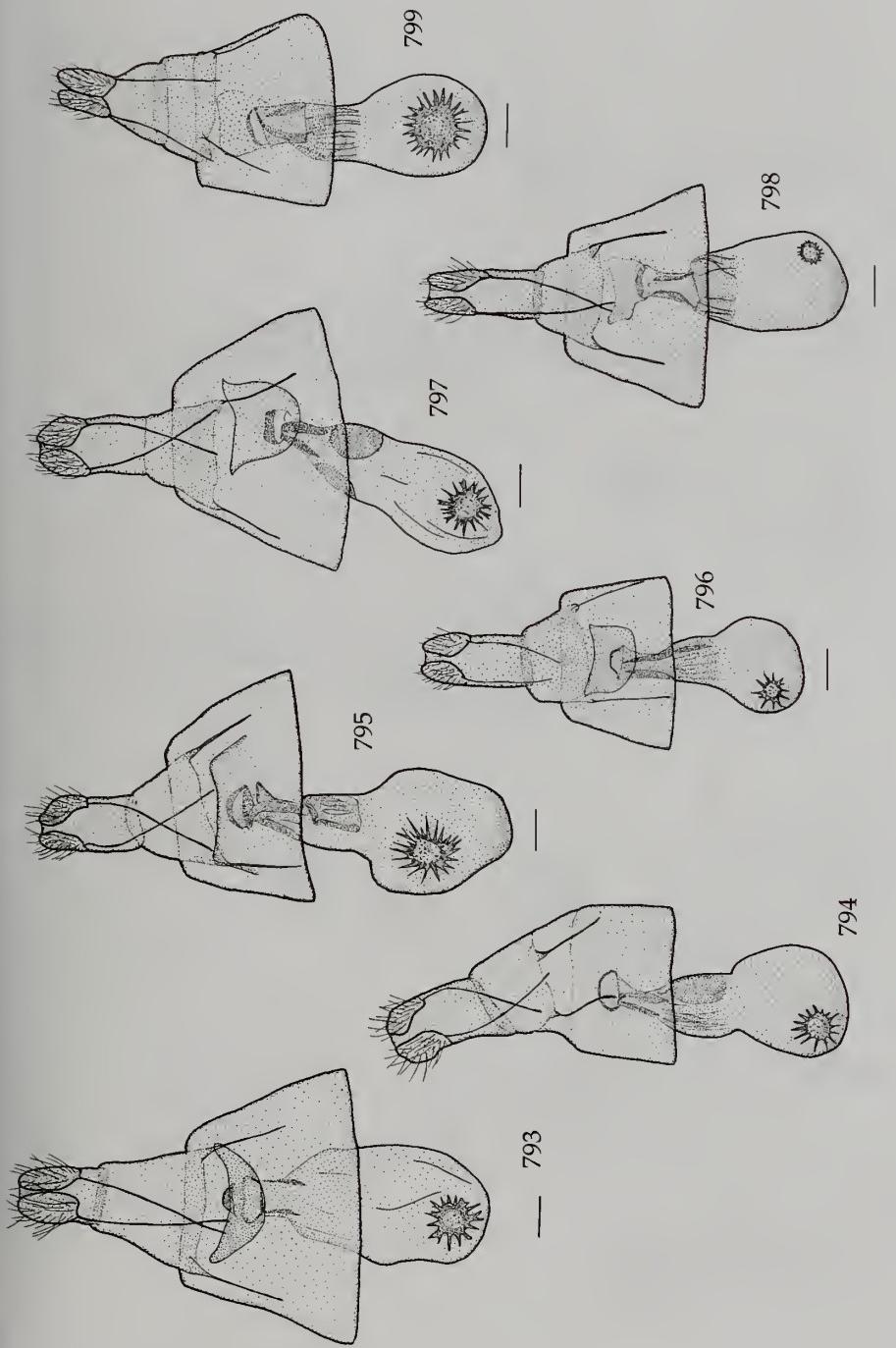
Figs 777-780. Female genitalia. 777, *Isturgia sakalava* (Herbulot); 778, *I. minosaria duponcheli* (Prout); 779, *I. hausmanni* sp. n.; 780, *I. terminipuncta* sp. n. Scale-bar = 0.3 mm.



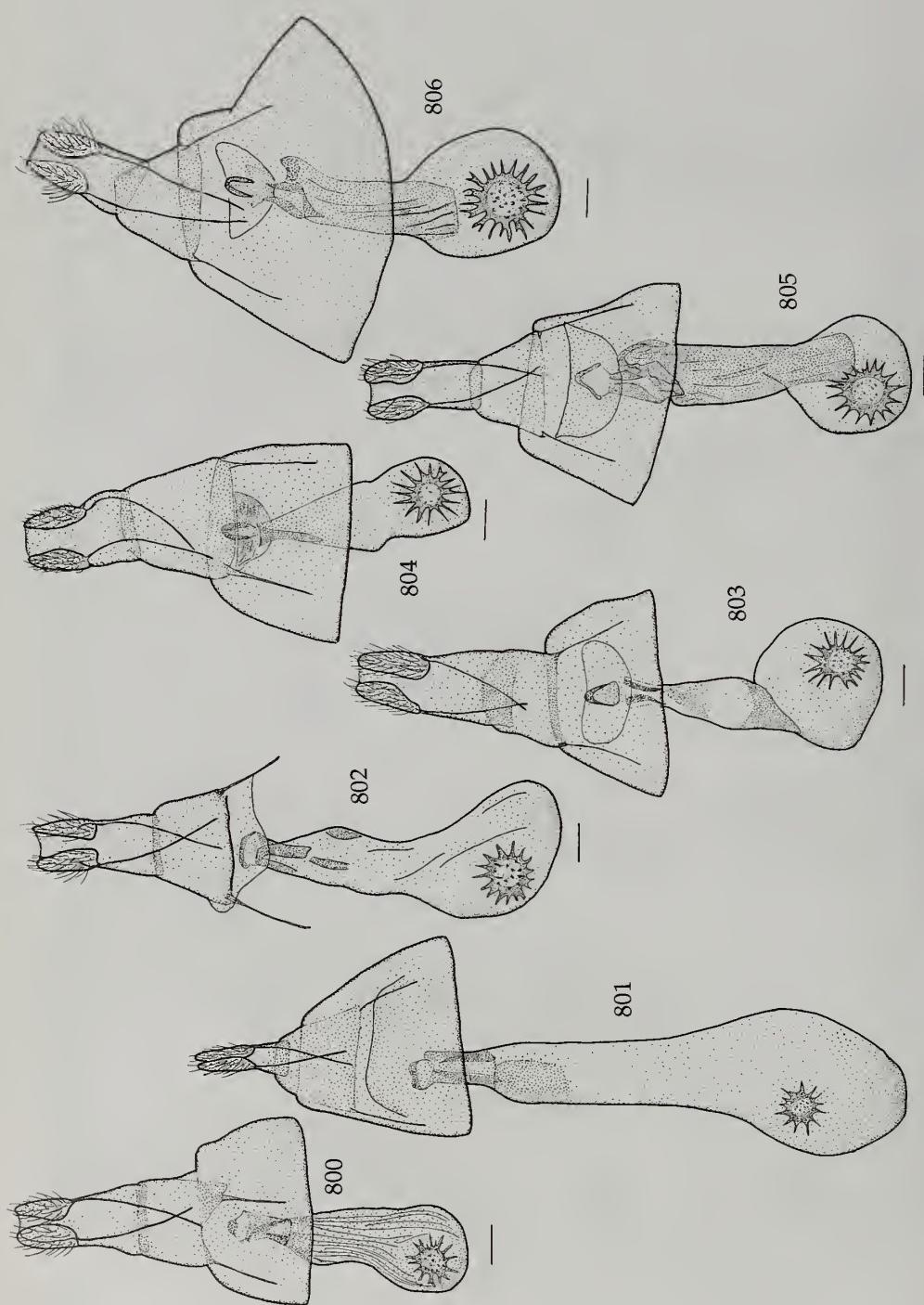
Figs 781-786. Female genitalia. 781, *Isturgia supergressa* (Prout); 782, *I. prionogyna* (Prout); 783, *I. xospilaia* (Walker); 784, *I. contexta* (Saalmüller); 785, *I. modestaria* (Pagenstecher); 786, *I. averyi* (Viette). Scale-bar = 0.3 mm.



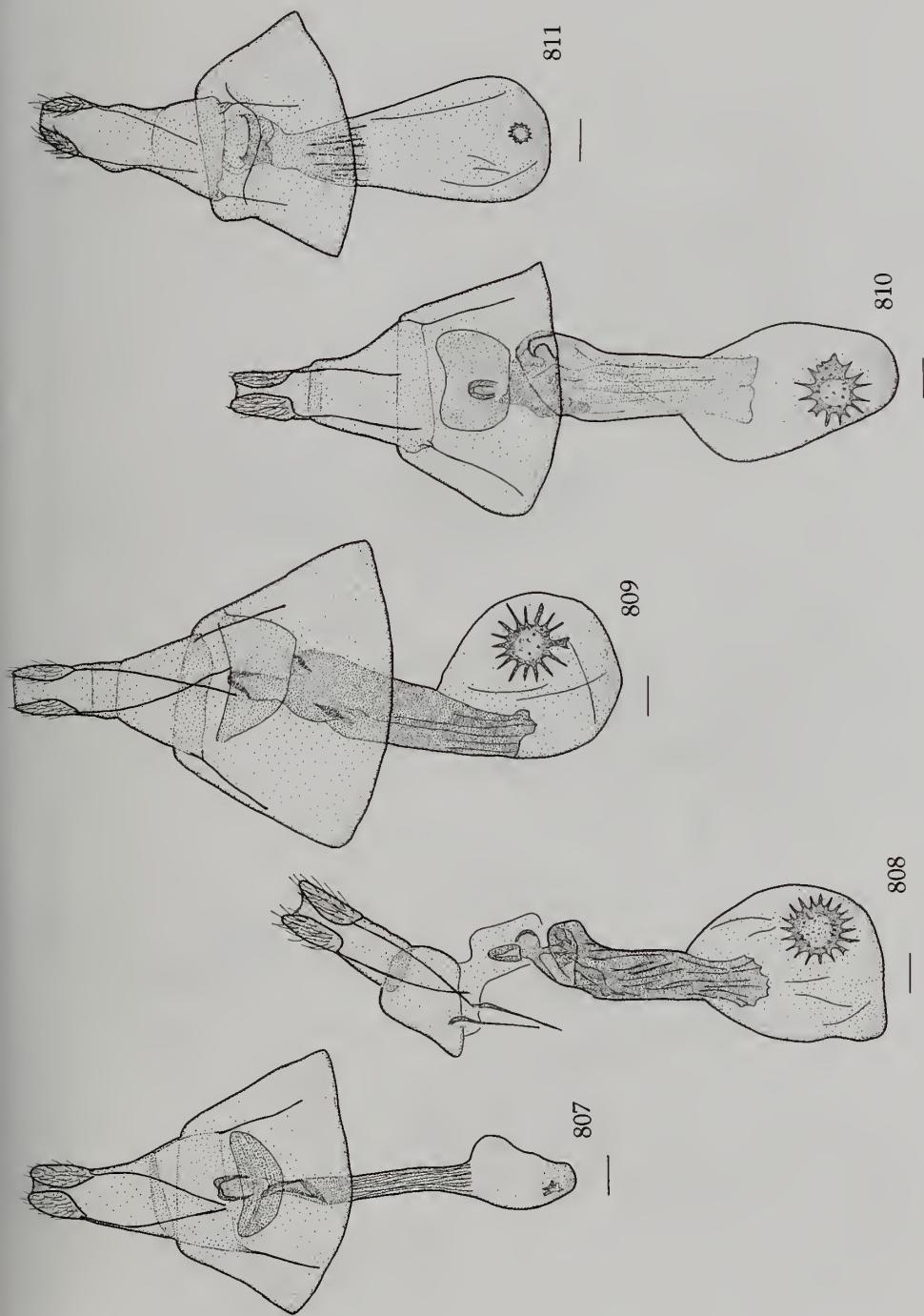
Figs 787-792. Female genitalia. 787, *Isturgia comorensis* sp. n.; 788, *I. berystaria* (Staudinger); 789, *I. spodiaria mizanensis* (Wehlhi); 790, *I. exustaria* (Staudinger); 791, *I. rubrator* (Hausmann); 792, *I. disputaria* (Guenée). Scale-bar = 0.3 mm.



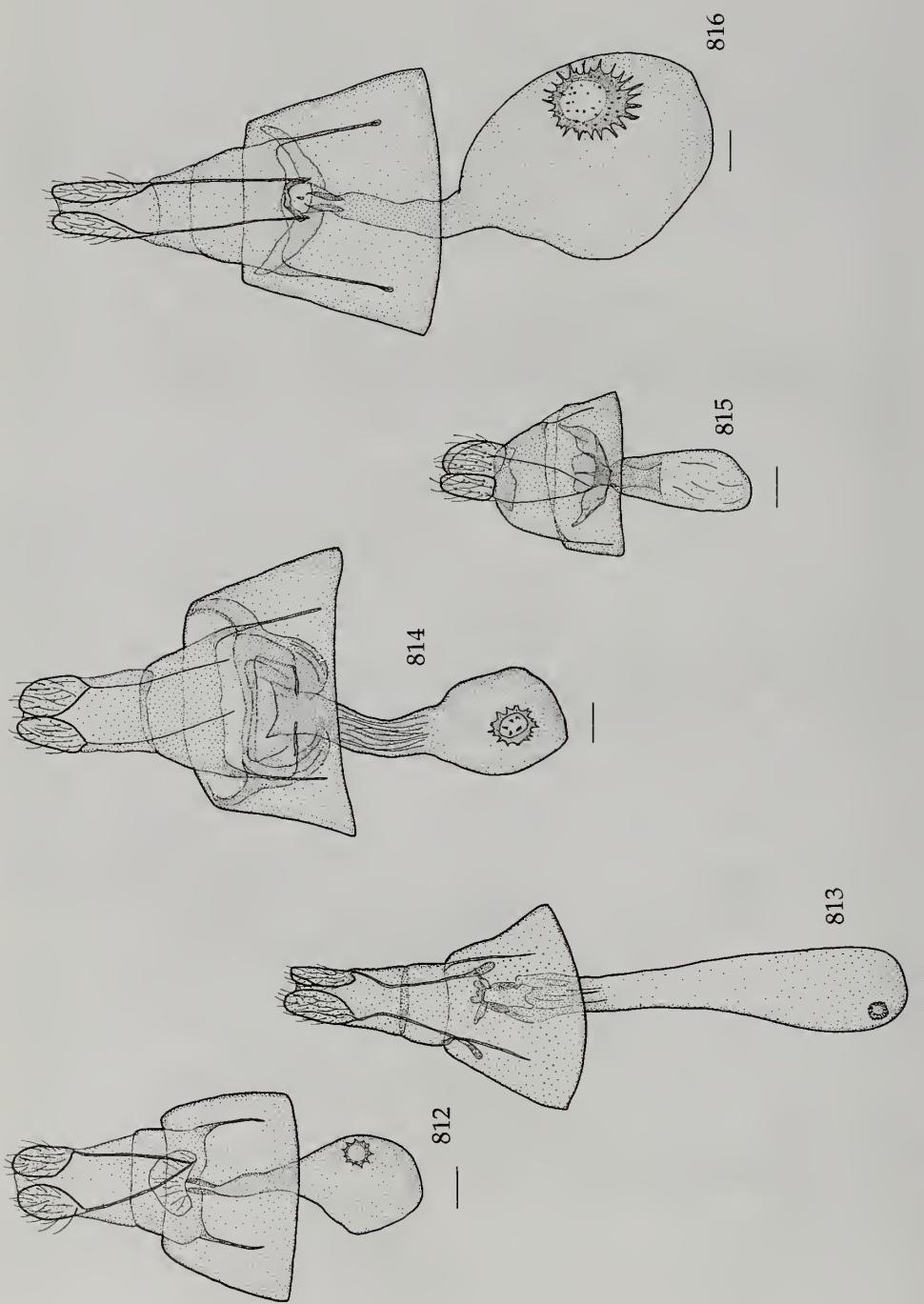
Figs 793-799. Female genitalia. 793, *Isturgia netta* (Holland); 794, *I. exerraria* (Prout); 795, *I. deerraria* (Walker); 796, *I. pygmacata* sp. n.; 797, *I. griveaudi* sp. n.; 798, *I. peruviana* (Lederer); 799, *I. sublimata* (Butler). Scale-bar = 0.3 mm.



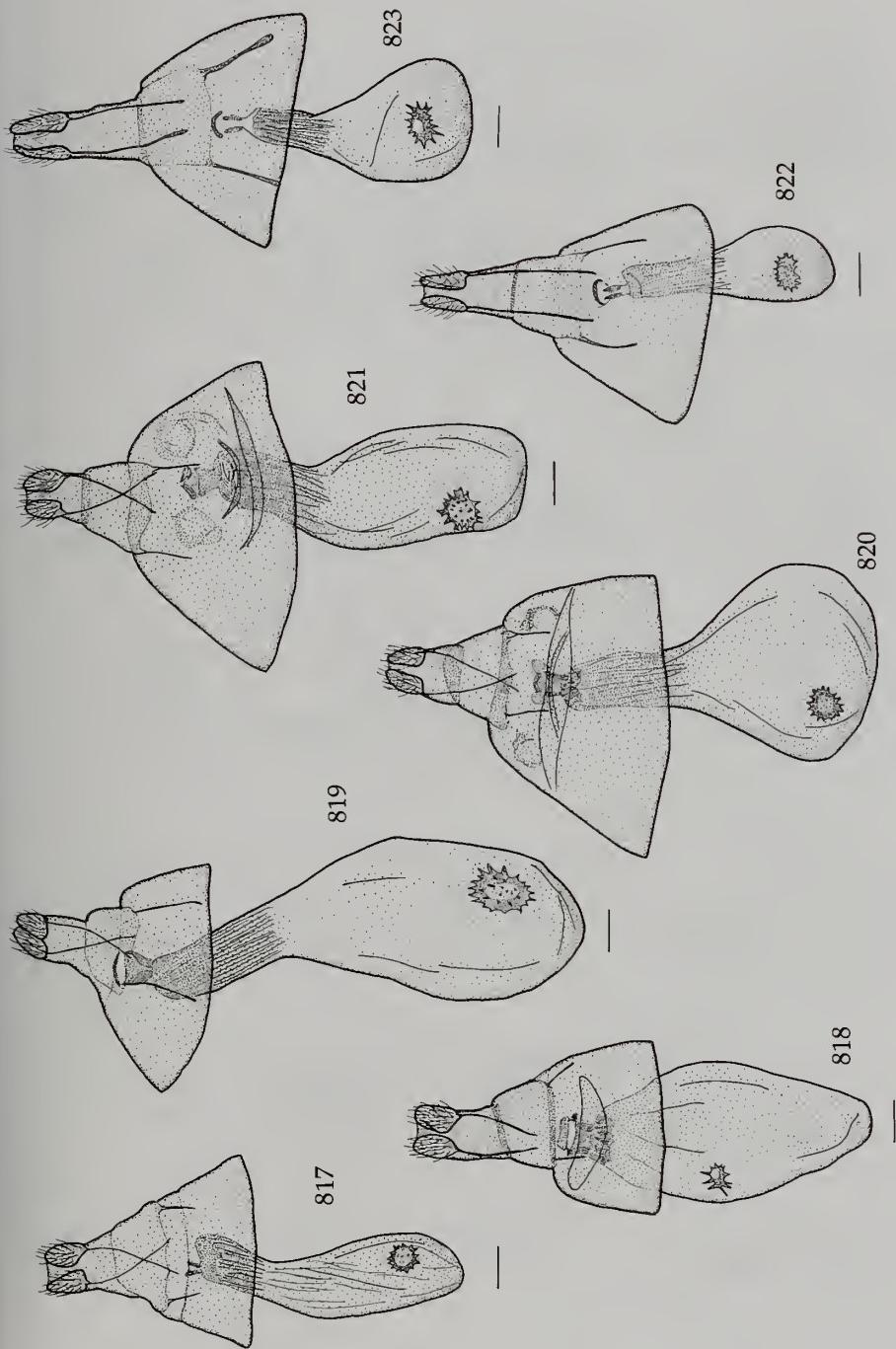
Figs 800-806. Female genitalia. 800, *I. arizela* (Fletcher); 801, *I. quadriplaga* (Rothschild); 802, *I. inaequifragaria* (Mabille); 803, *I. philbyi* (Wiltshire); 804, *I. spissata* (Walker); 805, *I. arizeloides* sp. n.; 806, *I. albogrisea* sp. n. Scale-bar = 0.3 mm.



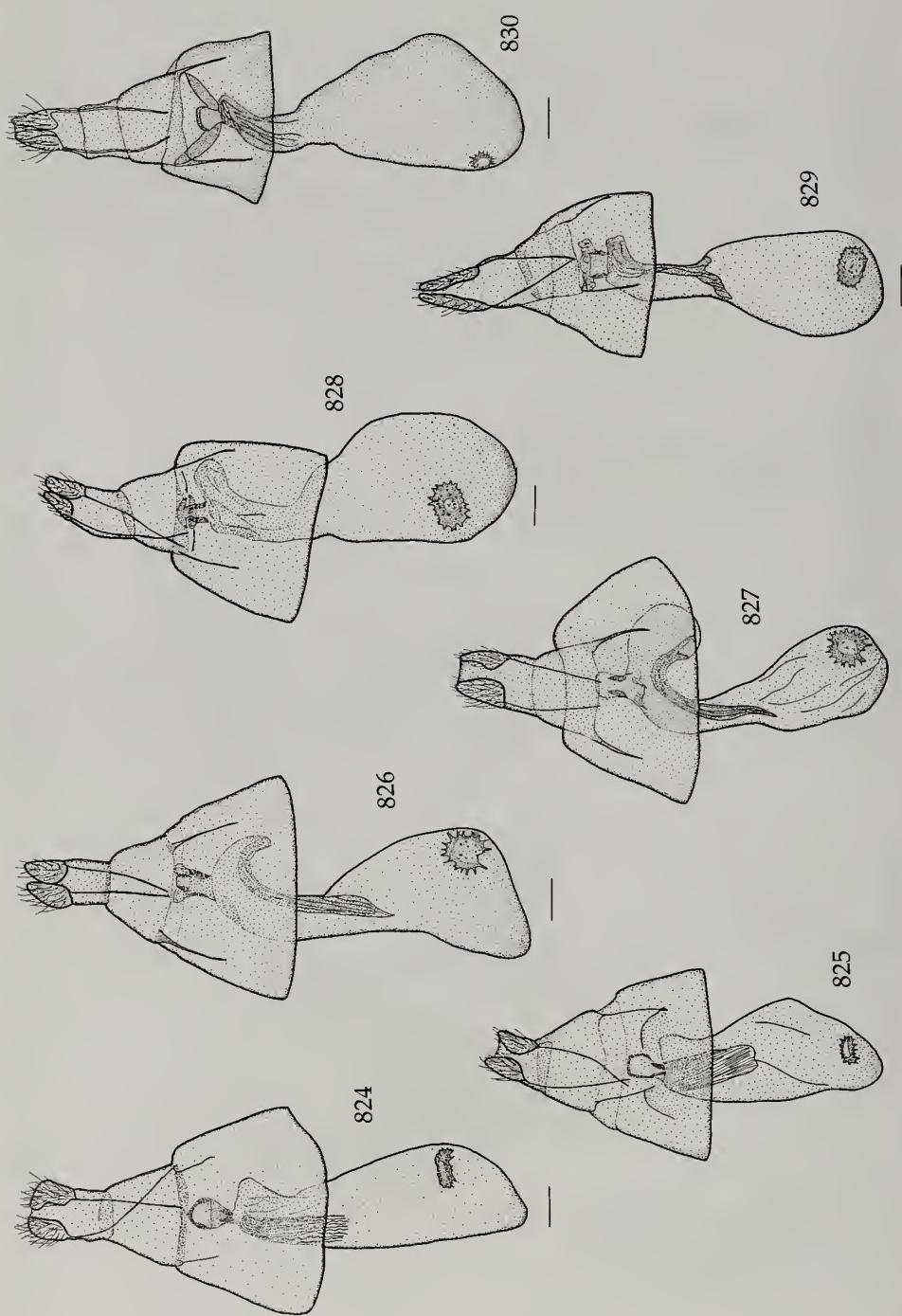
Figs 807-811. Female genitalia. 807, *Isturgia megasaccus* sp. n.; 808, *I. virens* sp. n.; 809, *I. presbitaria* (Swinhoe); 810, *I. devecta* (Herbulot). Scale-bar = 0.3 mm.



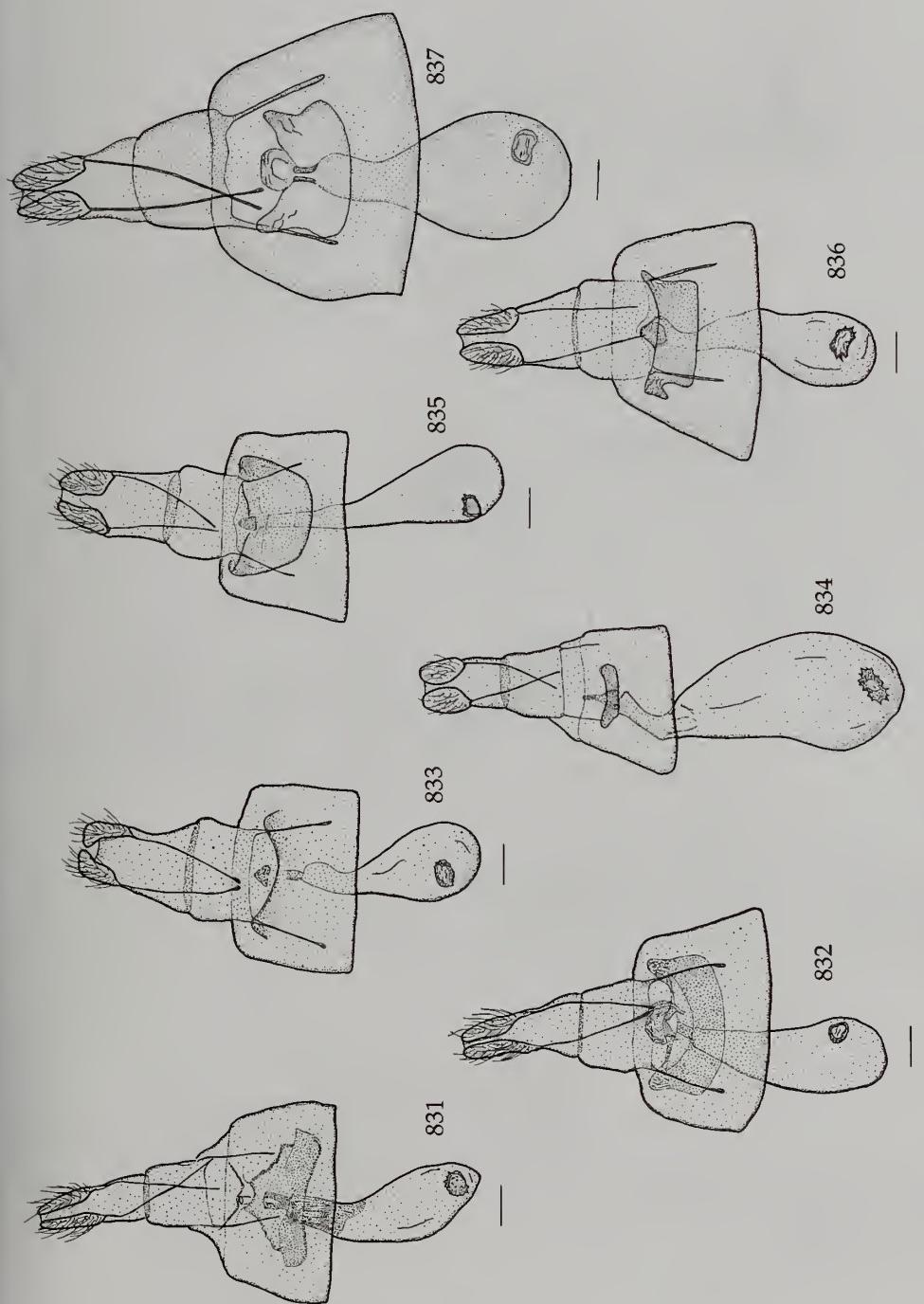
Figs 812-816. Female genitalia. 812, *Isturgia famula brunnea* (Le Cerf); 813, *I. geminata* (Warren); 814, *Hame vincularia* (Hubner); 815, *Boarmioides colpia* (Prout); 816, *Macaria wauaria wauaria* (Linnaeus). Scale-bar = 0.3 mm.



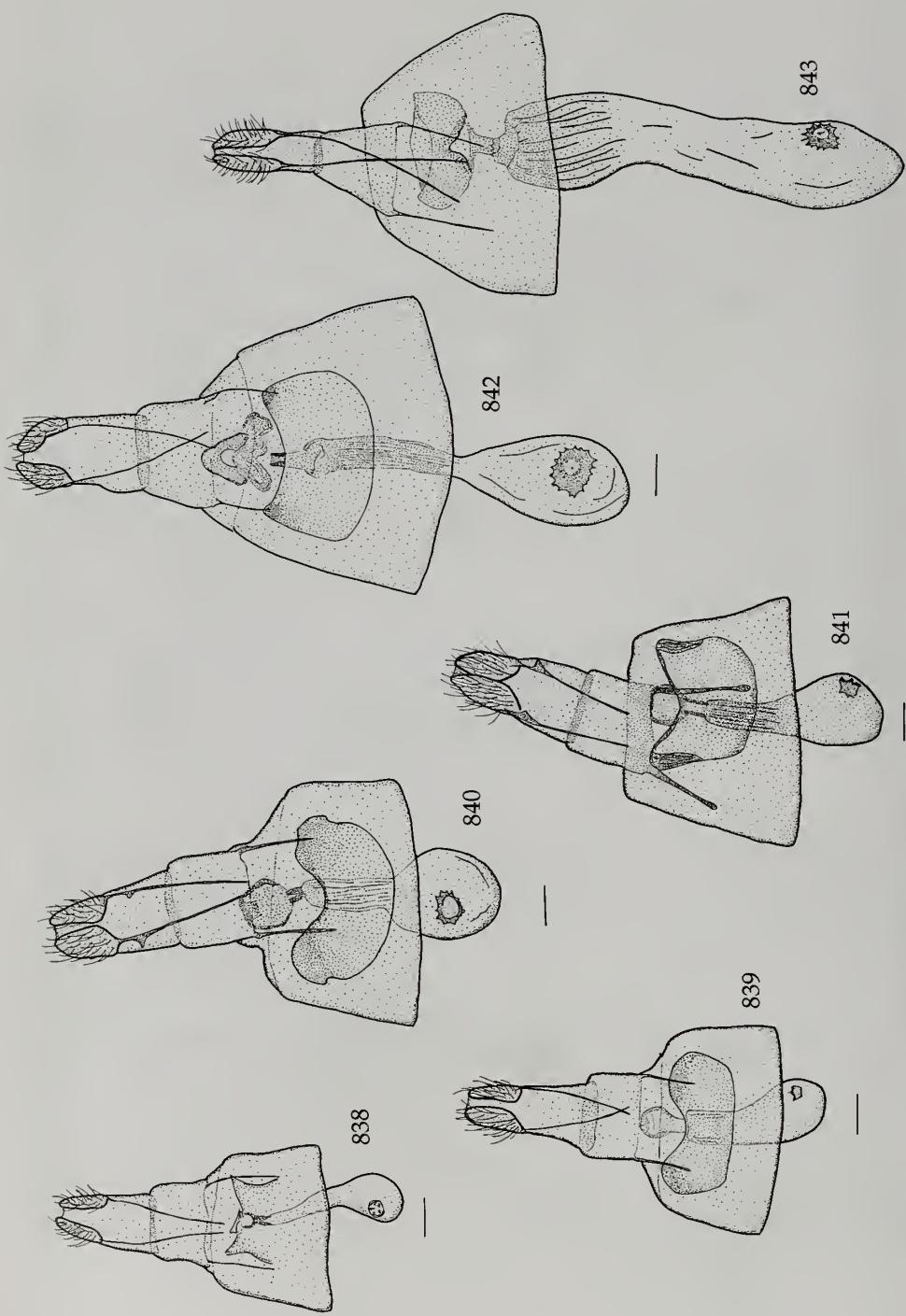
Figs 817-823. Female genitalia. 817, *Chiasmia californica* (Prout); 818, *C. puerilis* (Prout); 819, *C. featheri* (Prout); 820, *C. zelota* (Prout); 821, *C. ate* (Prout); 822, *C. tecnum* (Prout); 823, *C. frontosa* (Wiltshire). Scale-bar = 0.3 mm.



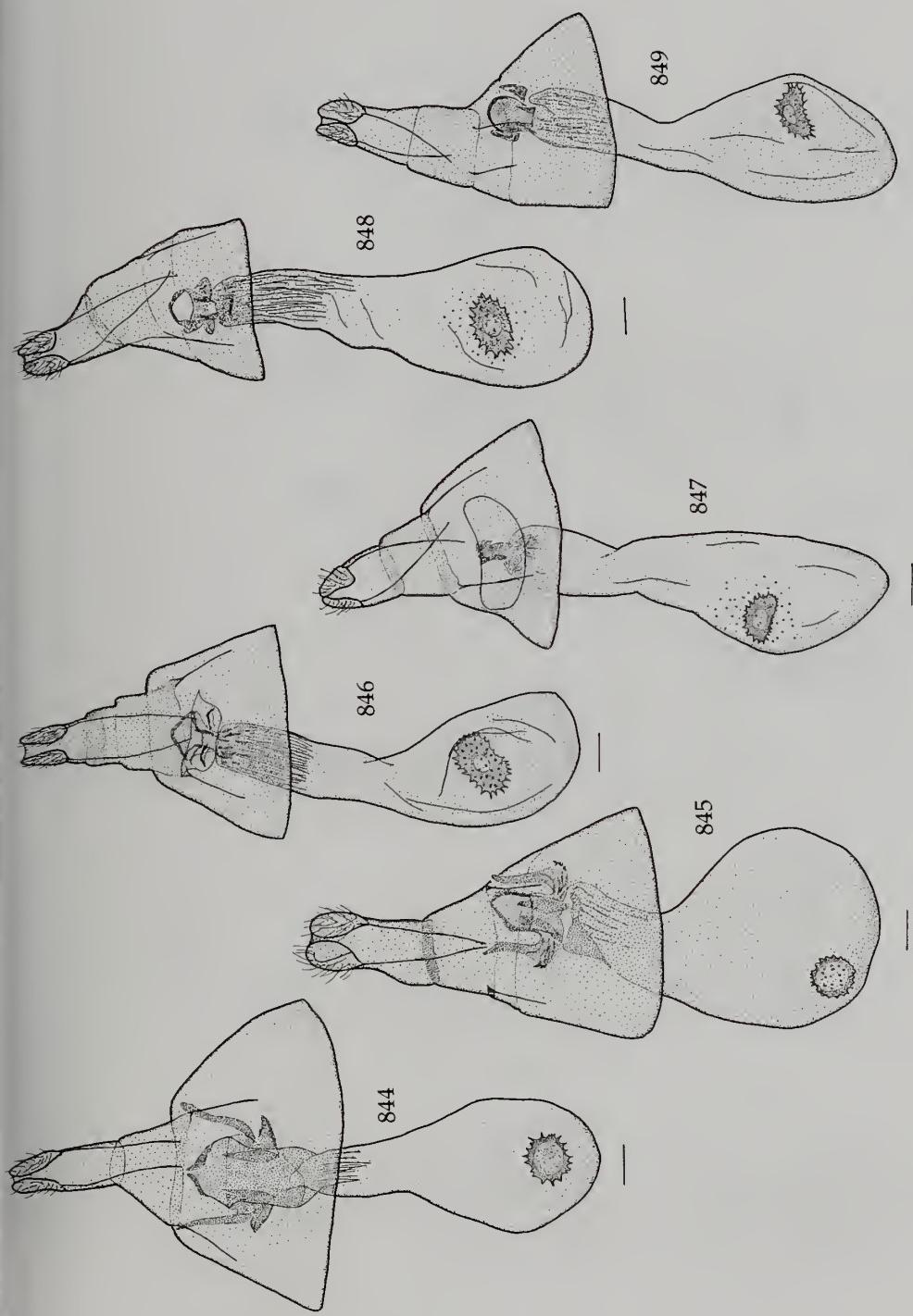
Figs 824-830. Female genitalia. 824, *Chiasmia trinotata* (Warren); 825, *C. trinotata* sp. n.; 826, *C. dilatata* (Prout); 827, *C. ngami* sp. n.; 828, *C. multata* (Warren); 829, *C. extrusilinea* (Warren); 830, *C. somatica* sp. n. Scale-bar = 0.3 mm.



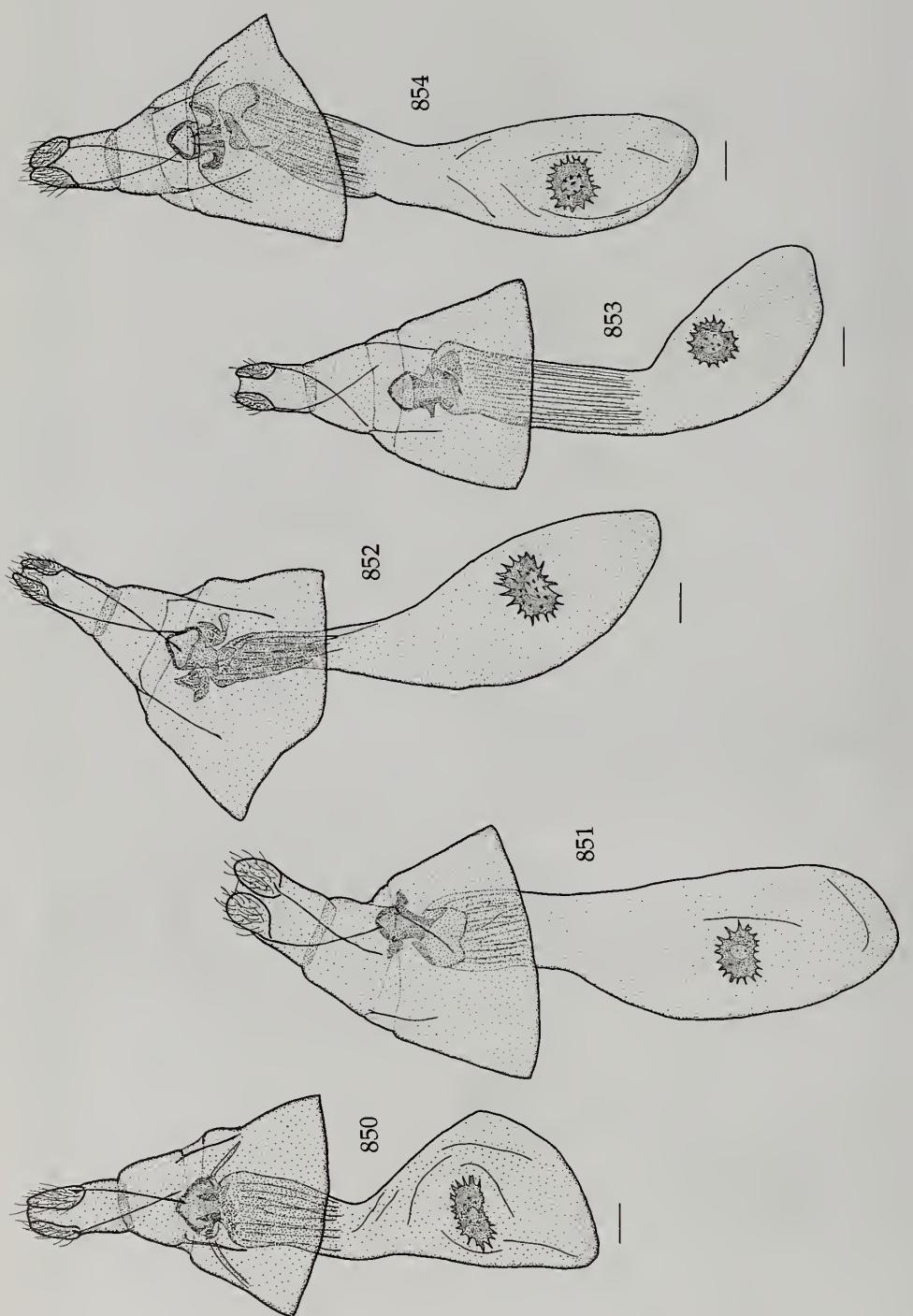
Figs 831-837. Female genitalia. 831, *Chiasmia semitecta* (Walker); 832, *C. brunnescens* sp. n.; 833, *C. griseascens* (Prout); 834, *C. murina* sp. n.; 835, *C. hunyami* sp. n.; 836, *C. melsetter* sp. n.; 837, *C. pineheyi* sp. n. Scale-bar = 0.3 mm.



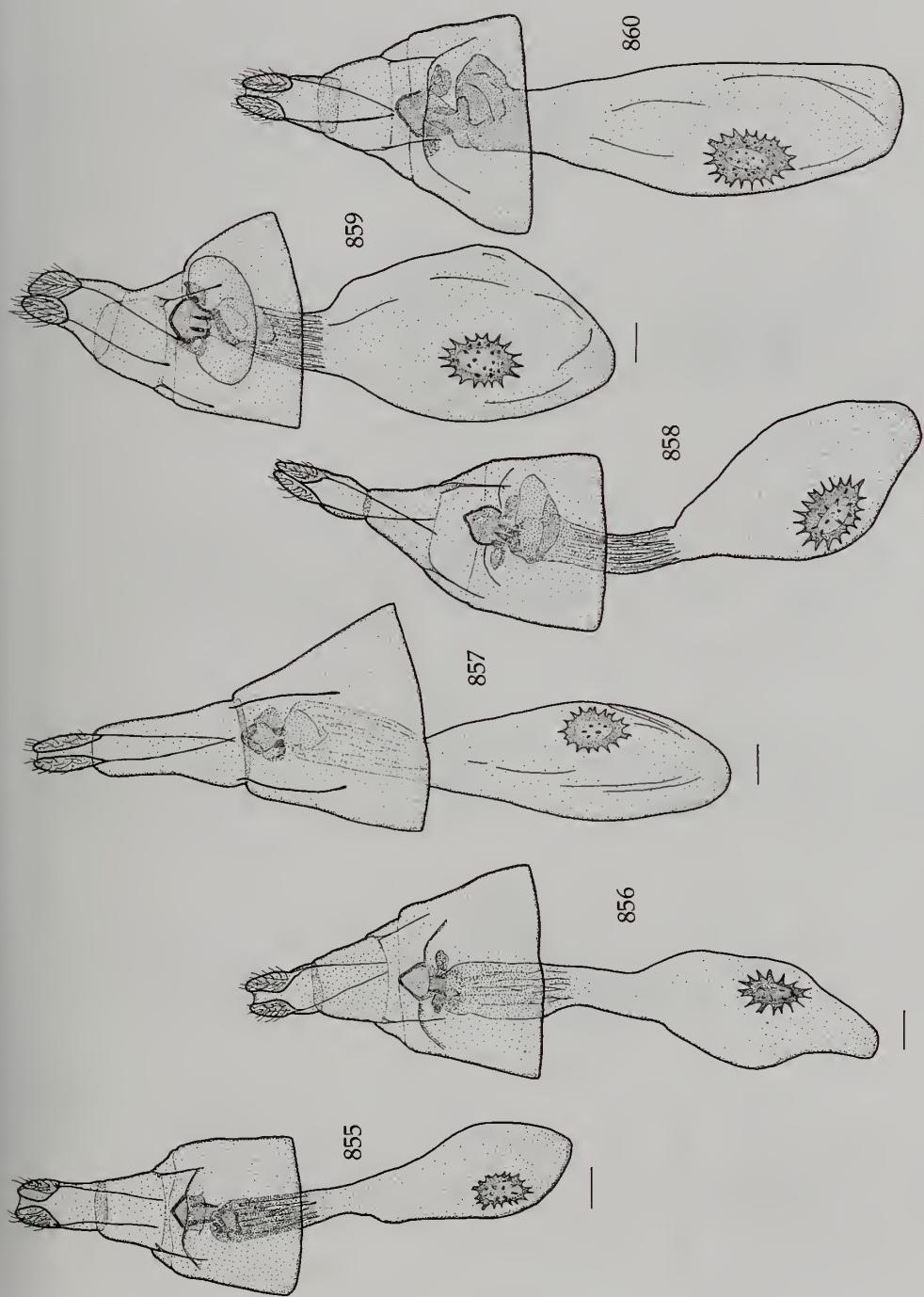
Figs 838-843. Female genitalia. 838, *Chiasmia alternata* (Warren); 839, *C. orthostates* (Prout); 840, *C. johnstonii* (Butler); 841, *C. semicolor* (Warren); 842, *C. rhabdophora* (Holland); 843, *C. nobilitata* (Prout). Scale-bar = 0.3 mm.



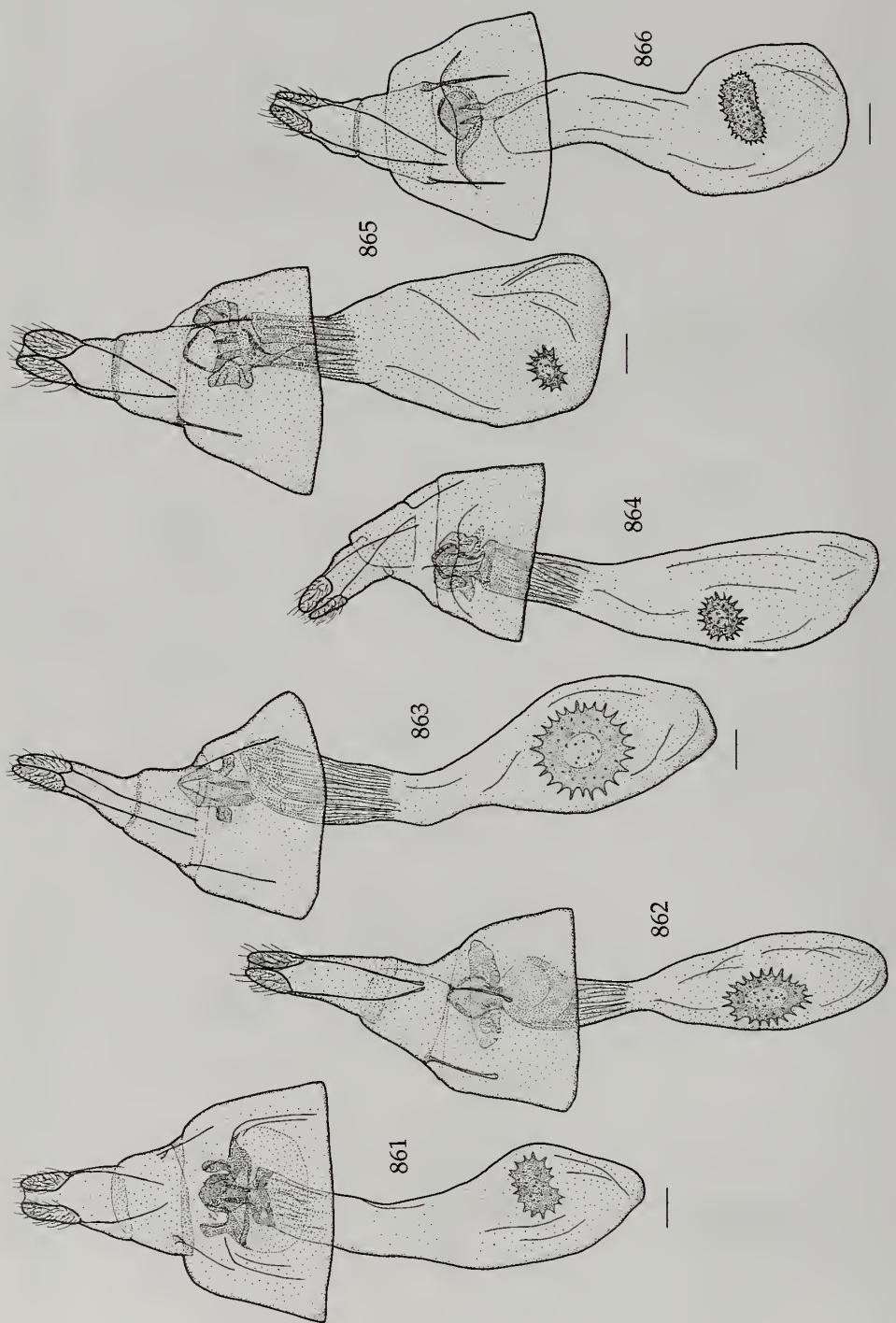
Figs 844-849. Female genitalia. 844, *Chiasmia infabricata* (Prout); 845, *C. adelpha* sp. n.; 846, *C. mirecurva* (Saalmüller); 847, *C. confusata* (Warren); 849, *C. fuscatoria* (Möschler). Scale-bar = 0.3 mm.



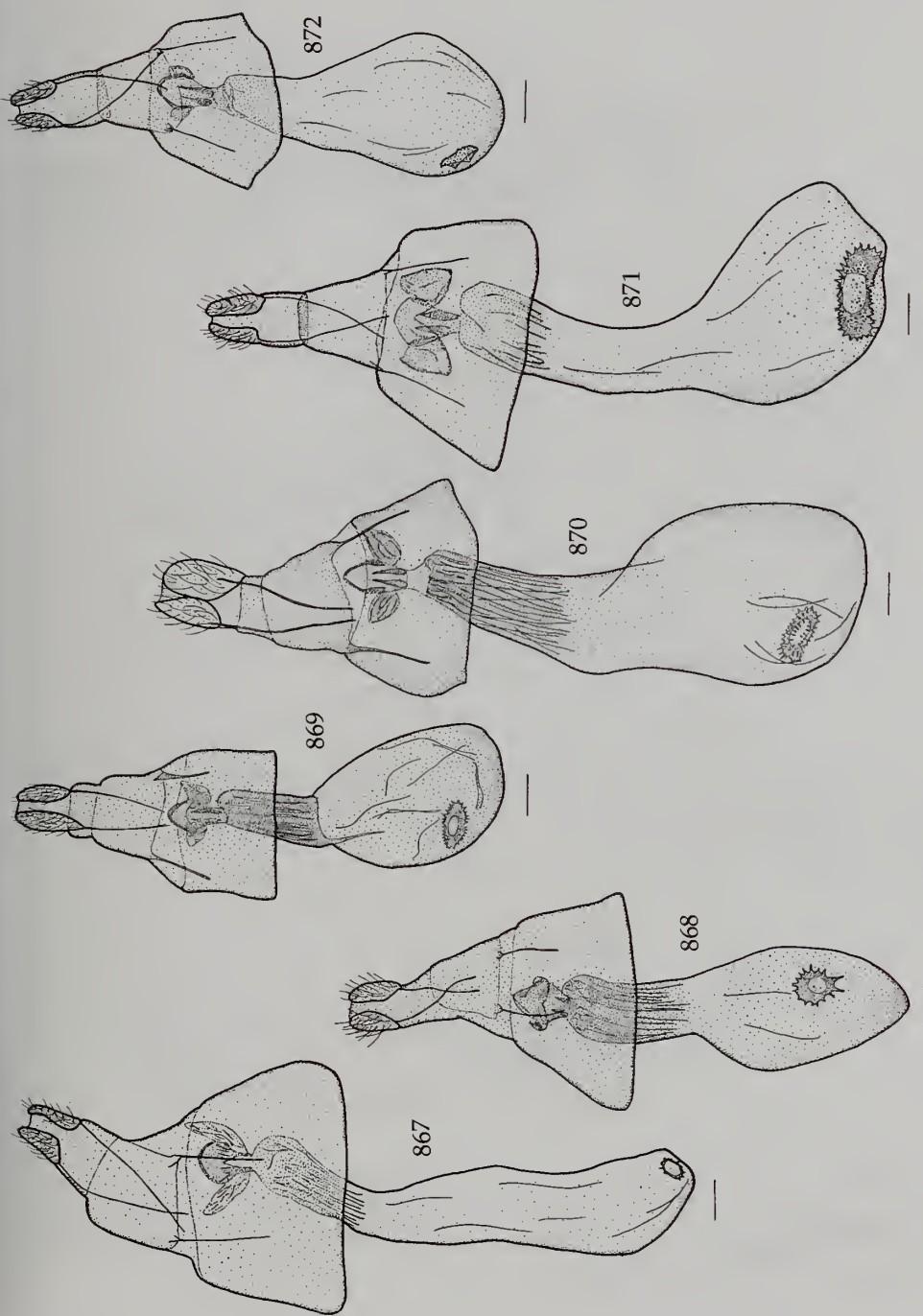
Figs 850–854. Female genitalia. 850, *Chiasmia malgassofusca* sp. n.; 851, *C. flavicuneata* (Herbulot); 852, *C. s. separata* (Warren); 853, *C. livorosa* (Herbulot); 854, *C. neolivorosa* sp. n. Scale-bar = 0.3 mm.



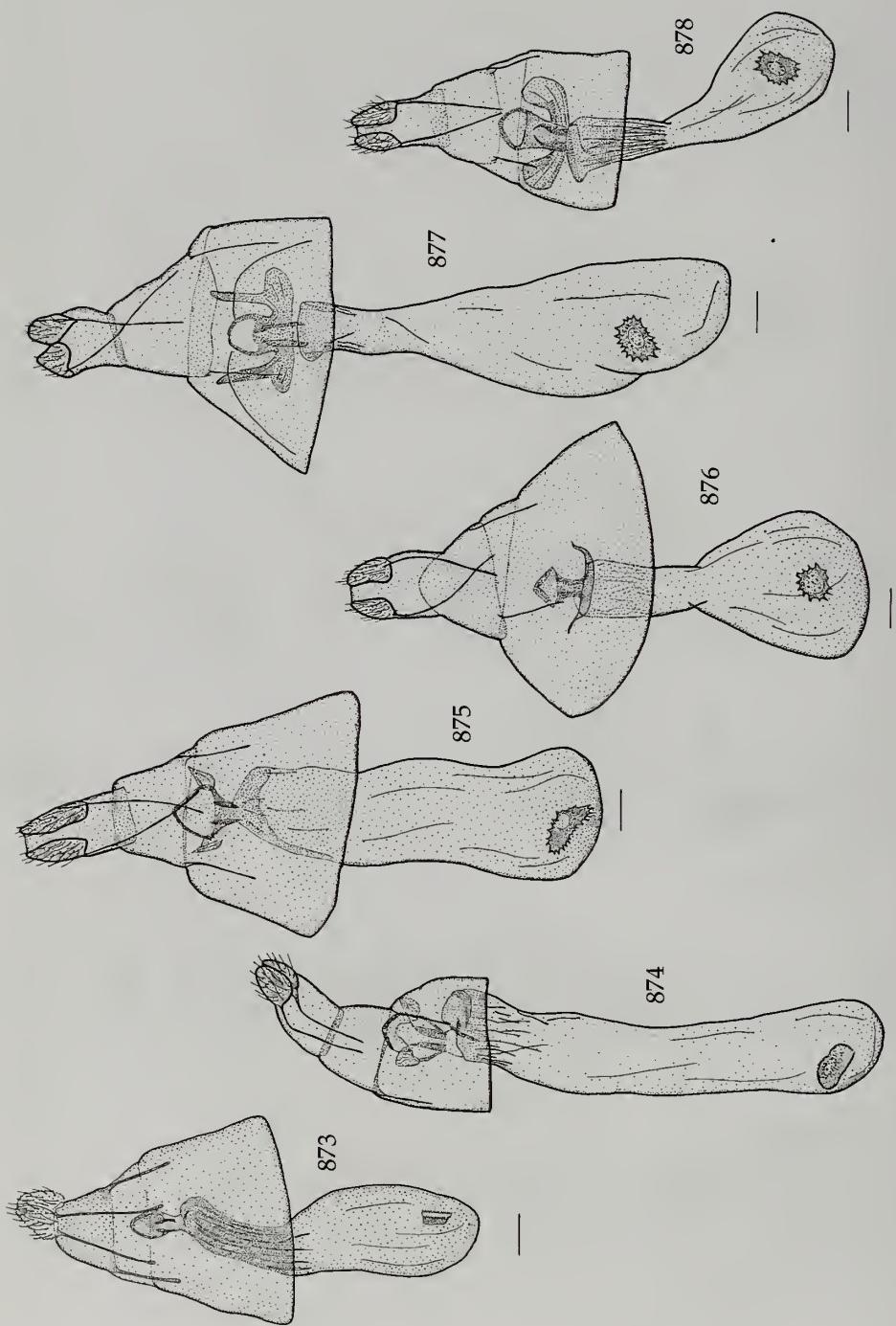
Figs 855-860. Female genitalia. 855, *Chiasmia parallacta* (Warren); 856, *C. paucimacula* sp. n.; 857, *C. phaeostigma* (Fletcher); 858, *C. natalensis* (Warren); 859, *C. coronoleucas* (Herbulot); 860, *C. fontainei* (Fletcher). Scale-bar = 0.3 mm.



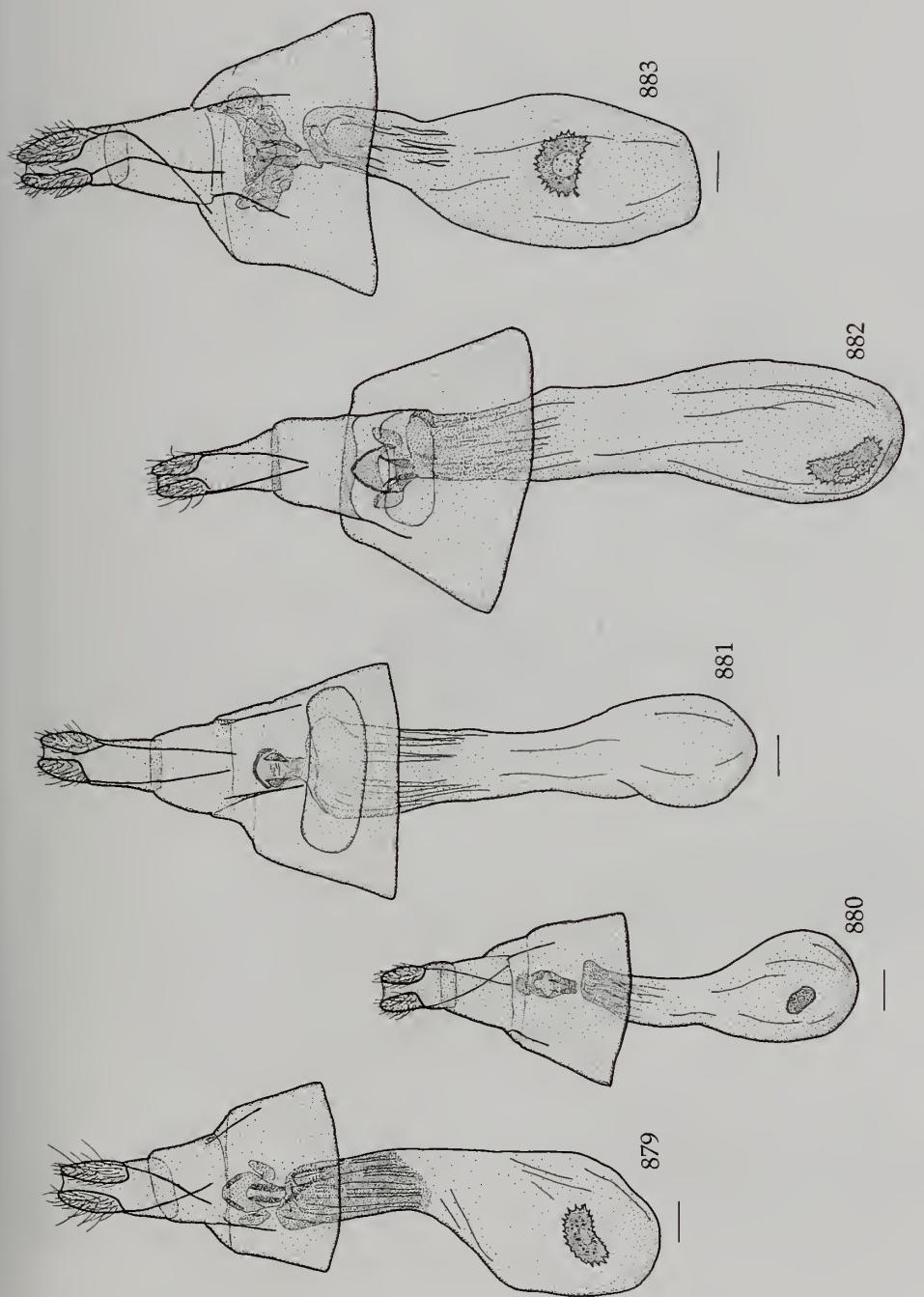
Figs 861–866. Female genitalia: 861, *Chiastmia threnopsis* (Fletcher); 862, *C. crumenata* (Fletcher); 863, *C. conturbata* (Warren); 864, *C. inquinata* sp. n.; 865, *C. insulicola* sp. n.; 866, *C. feraliata* (Guenée). Scale-bar = 0.3 mm.



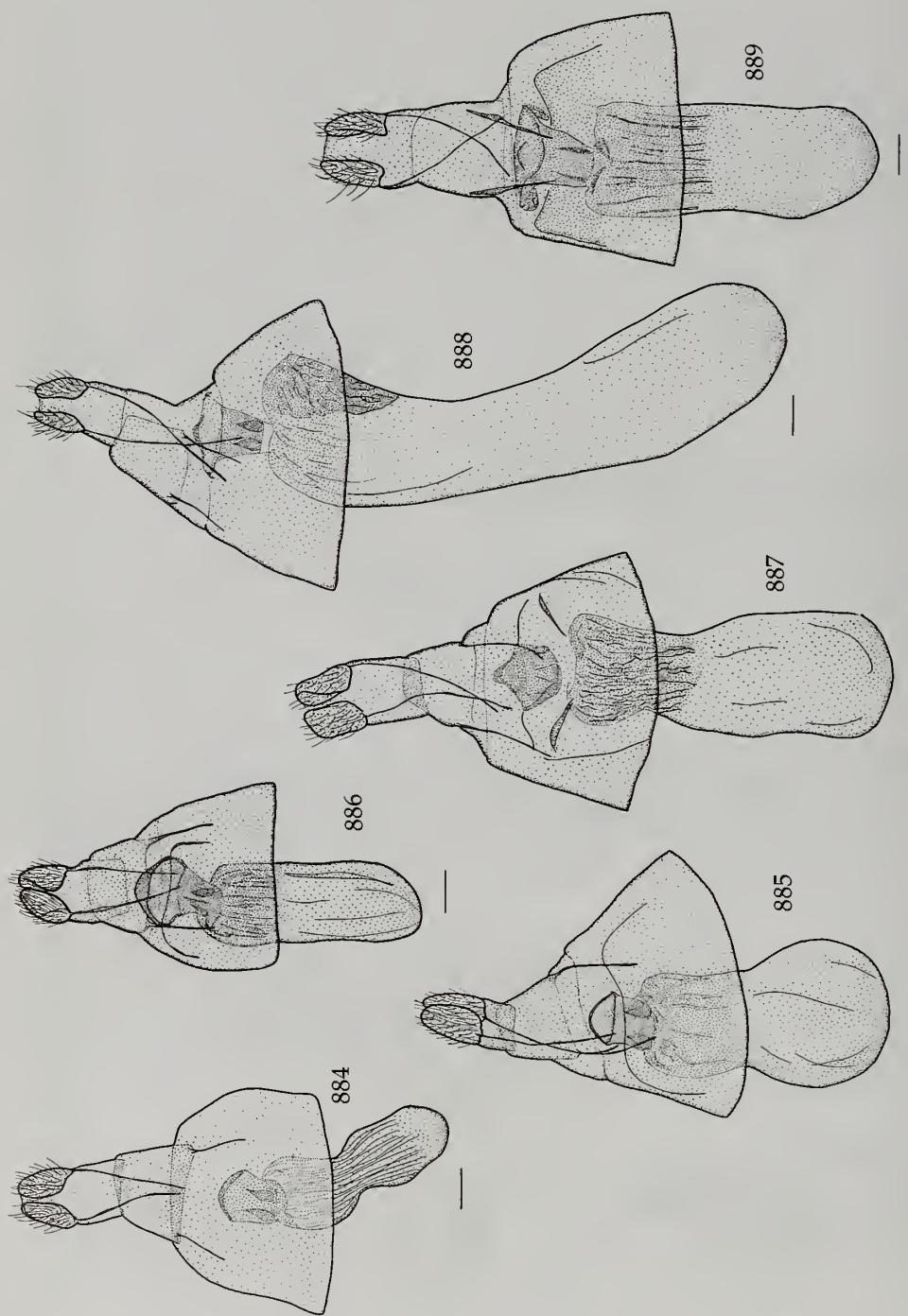
Figs 867-872. Female genitalia. 867, *Chiasmia a. amarata* (Guénée); 868, *C. evansi* sp. n.; 869, *C. kilifi* sp. n.; 870, *C. simplex* sp. n.; 871, *C. decipitrix* sp. n.; 872, *C. duplicitinea* (Warren). Scale-bar = 0.3 mm.



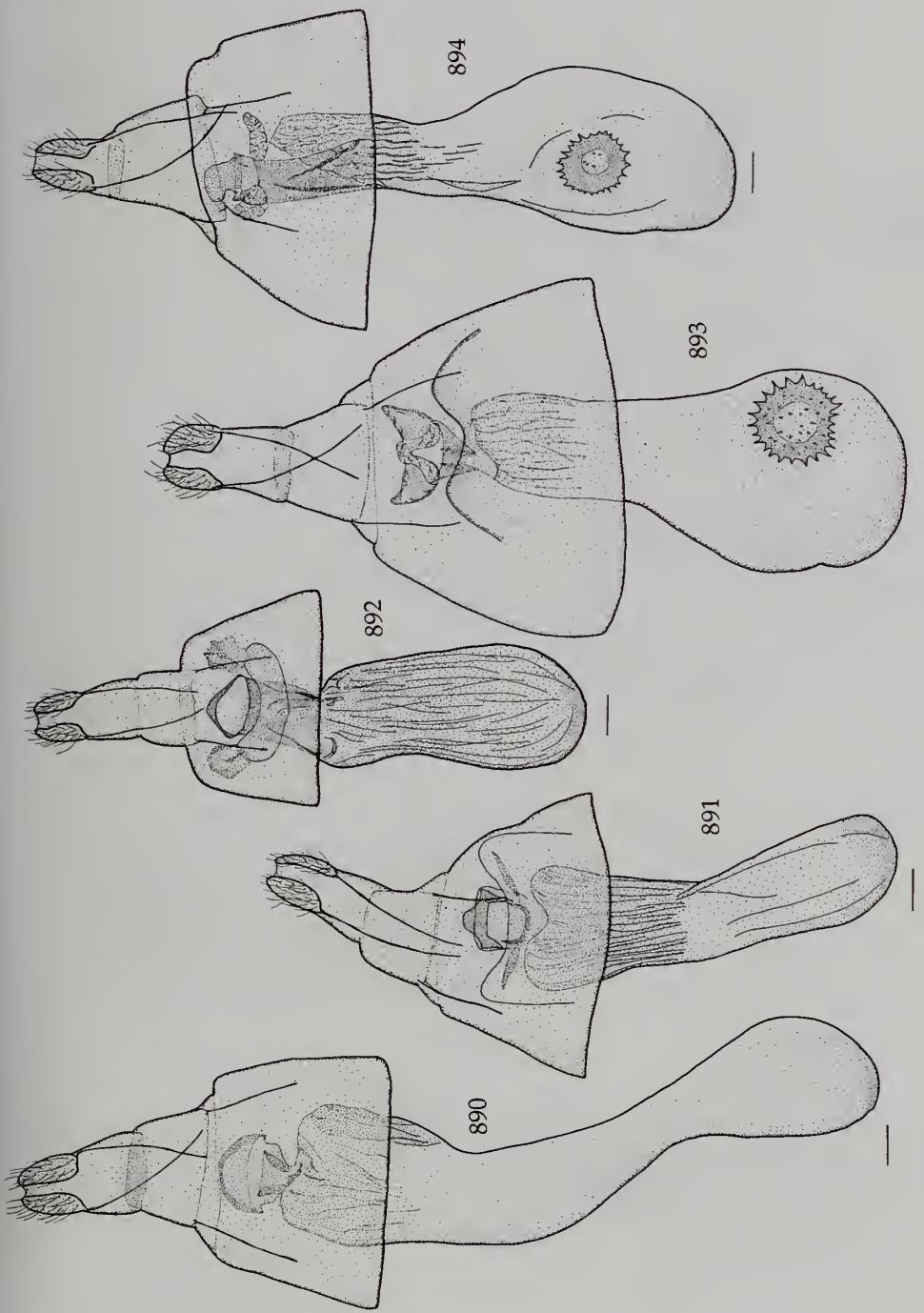
Figs 873-878. Female genitalia. 873, *Chiasmia megalesia* (Viereck); 874, *C. unigeminata* (Proust); 875, *C. costiguttata* (Warren); 876, *C. ?tenyae* sp. n.; 877, *C. orientalis* sp. n.; 878, *C. trigonoleuca* (Herbulot). Scale-bar = 0.3 mm.



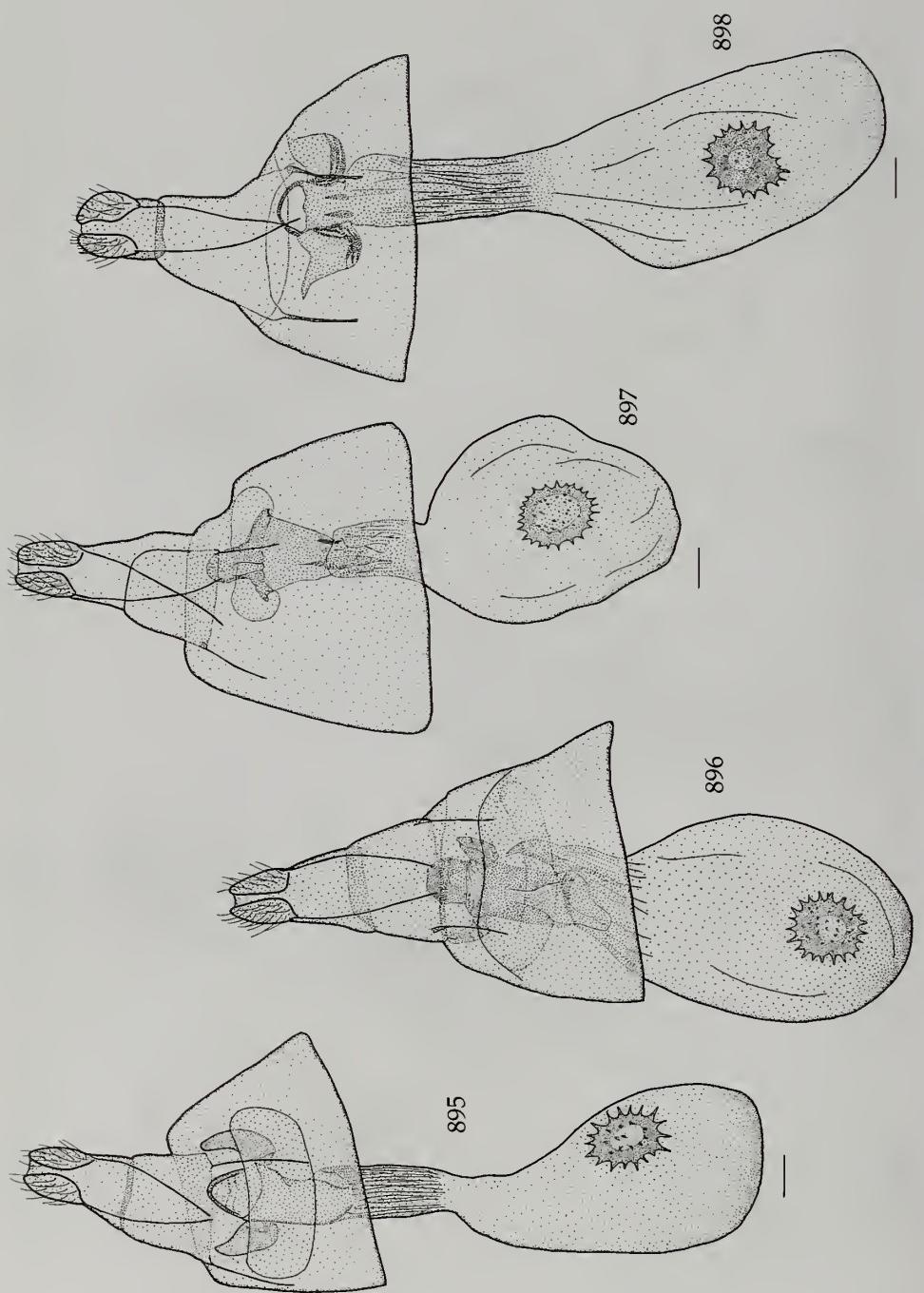
Figs 879-883. Female genitalia. 879, *Chiasmia phaeocrypsis* (Herbulot); 880, *C. subcretaria* (Warren); 881, *C. geminilinea* (Proud); 882, *C. abyssinica* sp. n.; 883, *C. subvaria* (Bastelberger). Scale-bar = 0.3 mm.



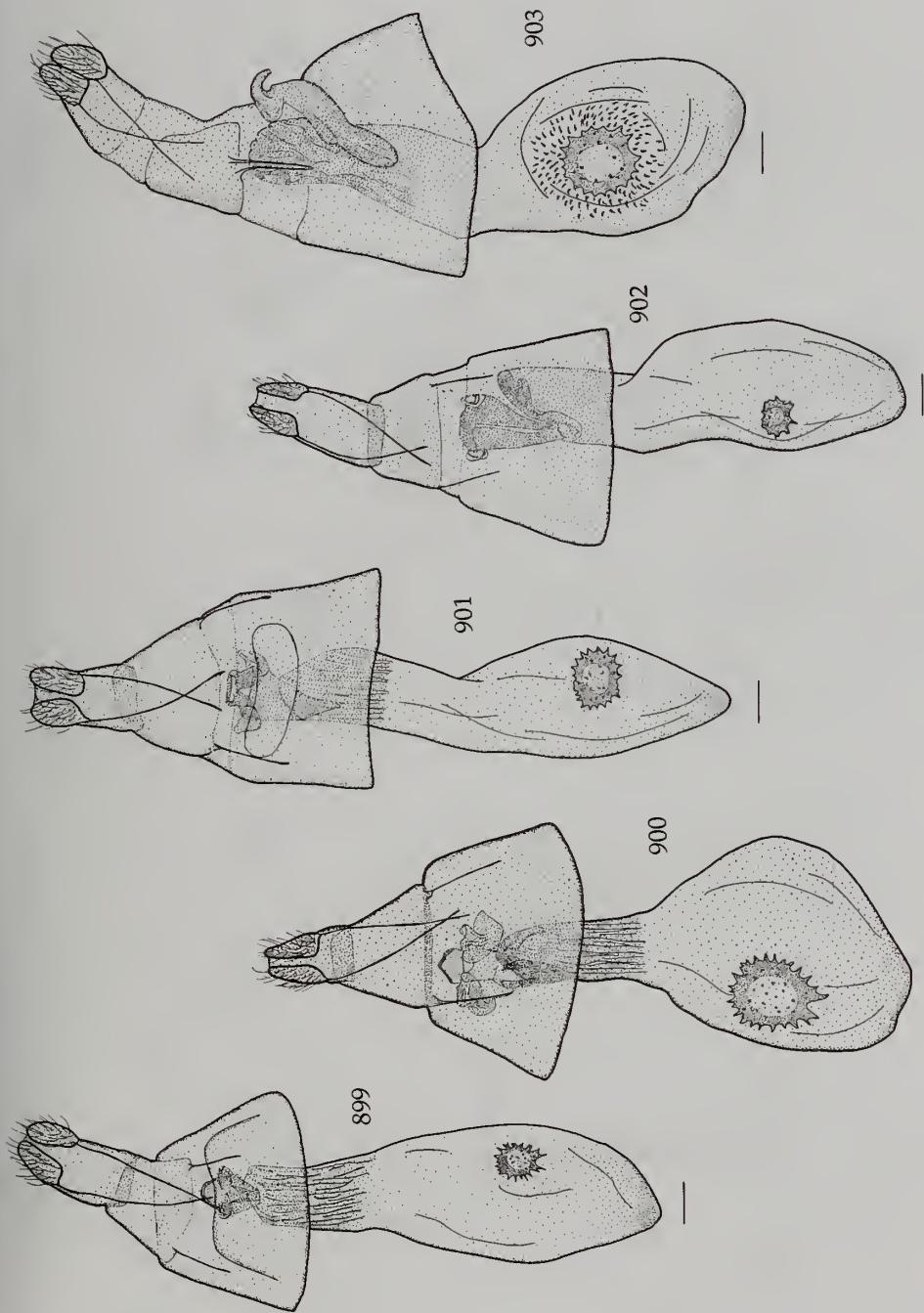
Figs 884–889. Female genitalia. 884, *Chiasmia aestinaria* (Hübner); 885, *C. sareptanaria* (Staudinger); 886, *C. syriacaria* (Staudinger); 887, *C. hypactinia* (Prout). Scale-bar = 0.3 mm.



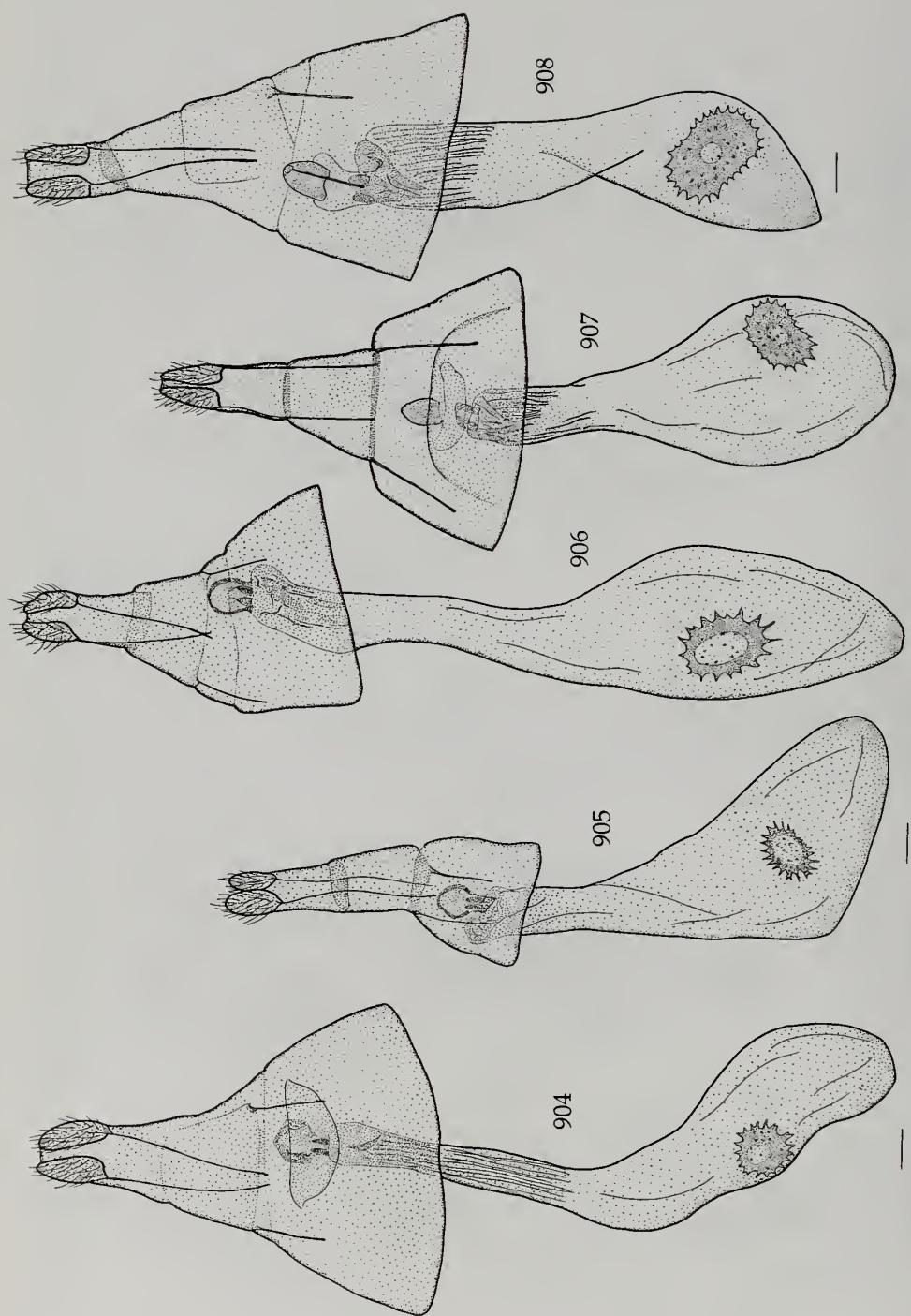
Figs 890-894. Female genitalia. 890, *Chiasmia tetraphicata* (Saalmüller); 891, *C. angolaria* (Snellen); 892, *C. buettikeri* (Wiltshire); 893, *C. ostentosaria* (Möschler); 894, *C. impar* (Warren).



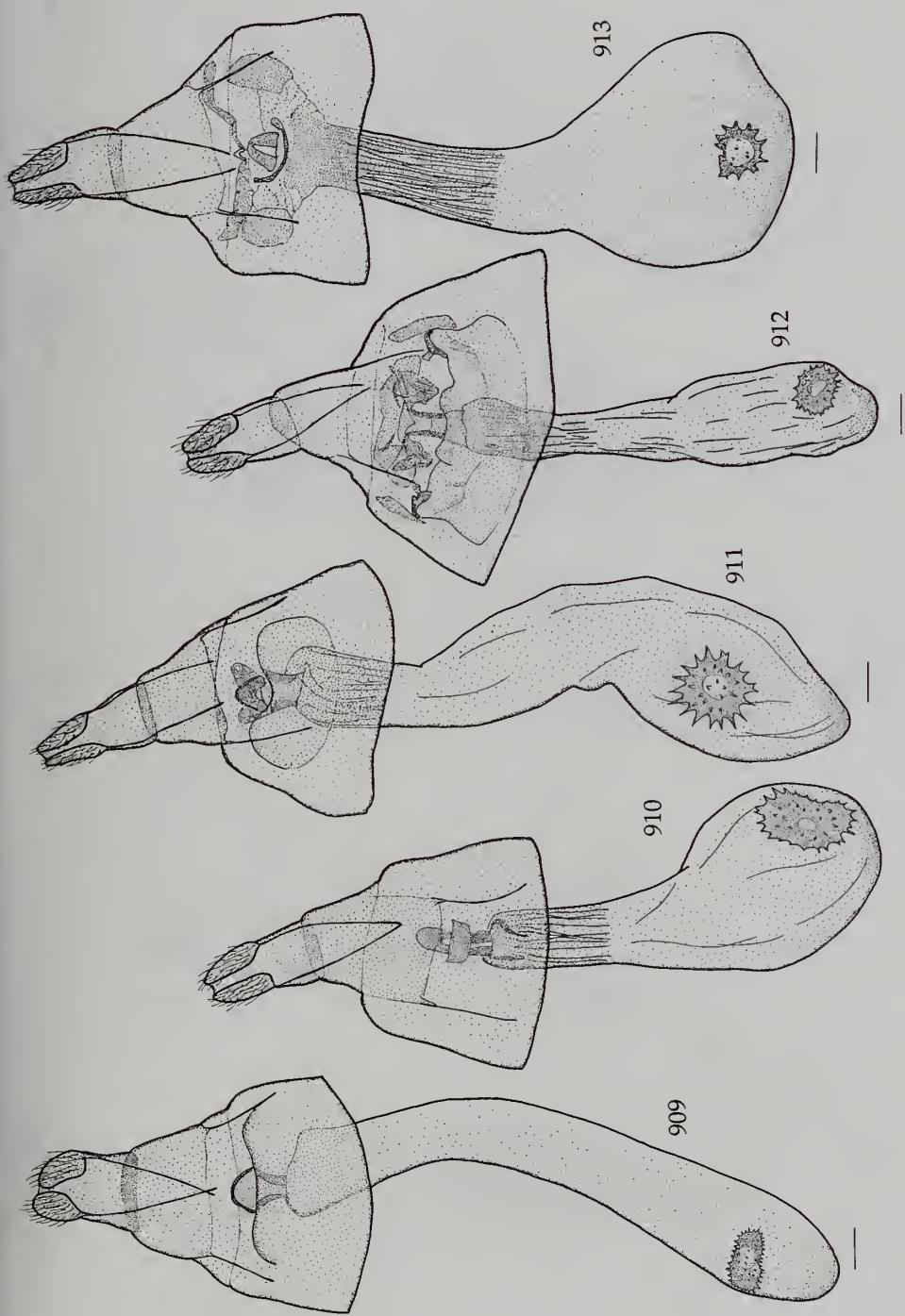
Figs 895–898. Female genitalia. 895, *Chiasmia grandis* sp. n.; 896, *C. pernoptera* (Prout); 897, *C. albivia* (Prout); 898, *C. fitzgeraldi* (Carcasson). Scale-bar = 0.3 mm.



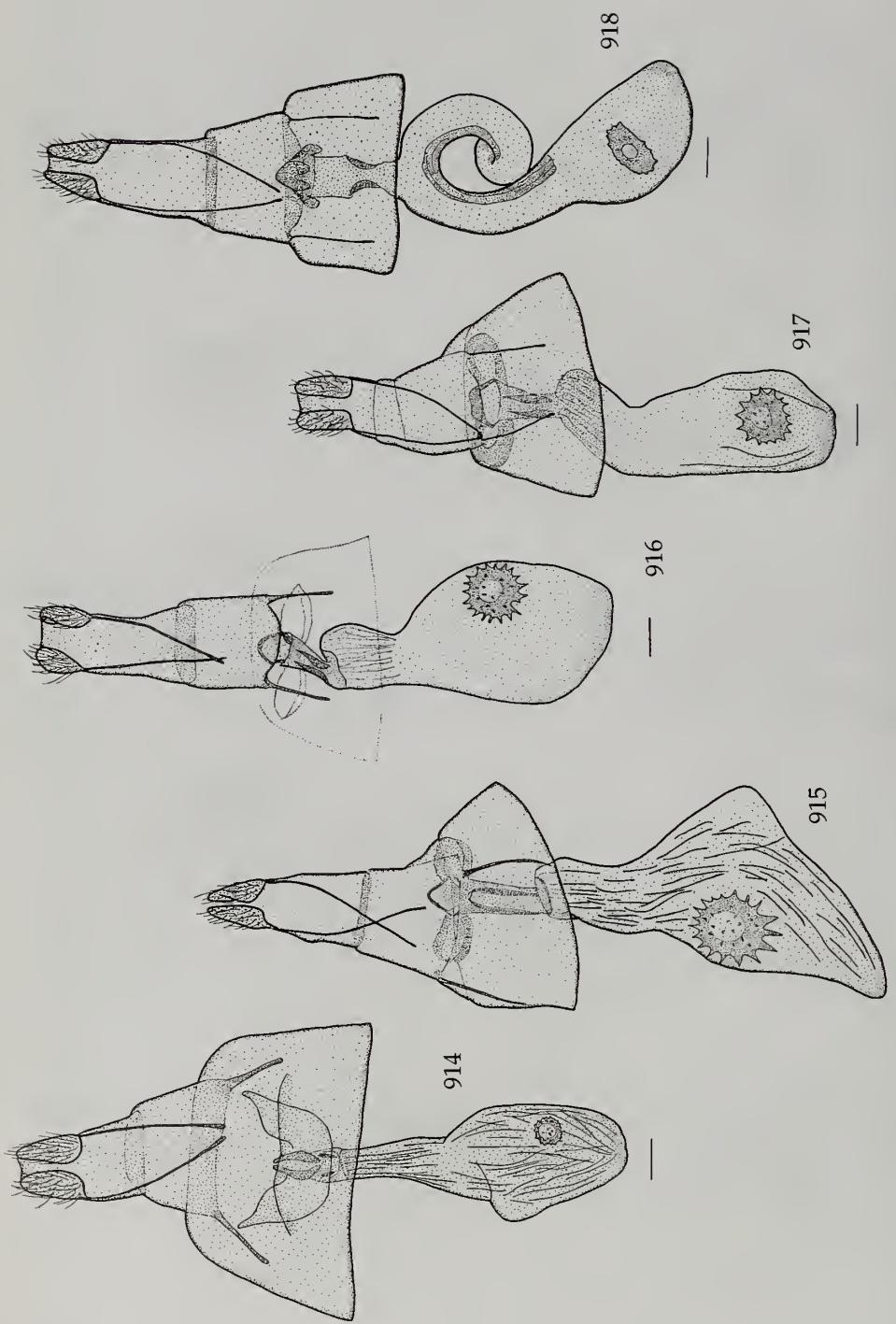
Figs 899–903. Female genitalia. 899, *Chiasmia crassilembaria* (Mabille); 900, *C. lu. umbriata* (Warren); 901, *C. maronga* sp. n.; 902, *C. aureobrunnea* sp. n.; 903, *C. i. inouei* (Herbulot). Scale-bar = 0.3 mm.



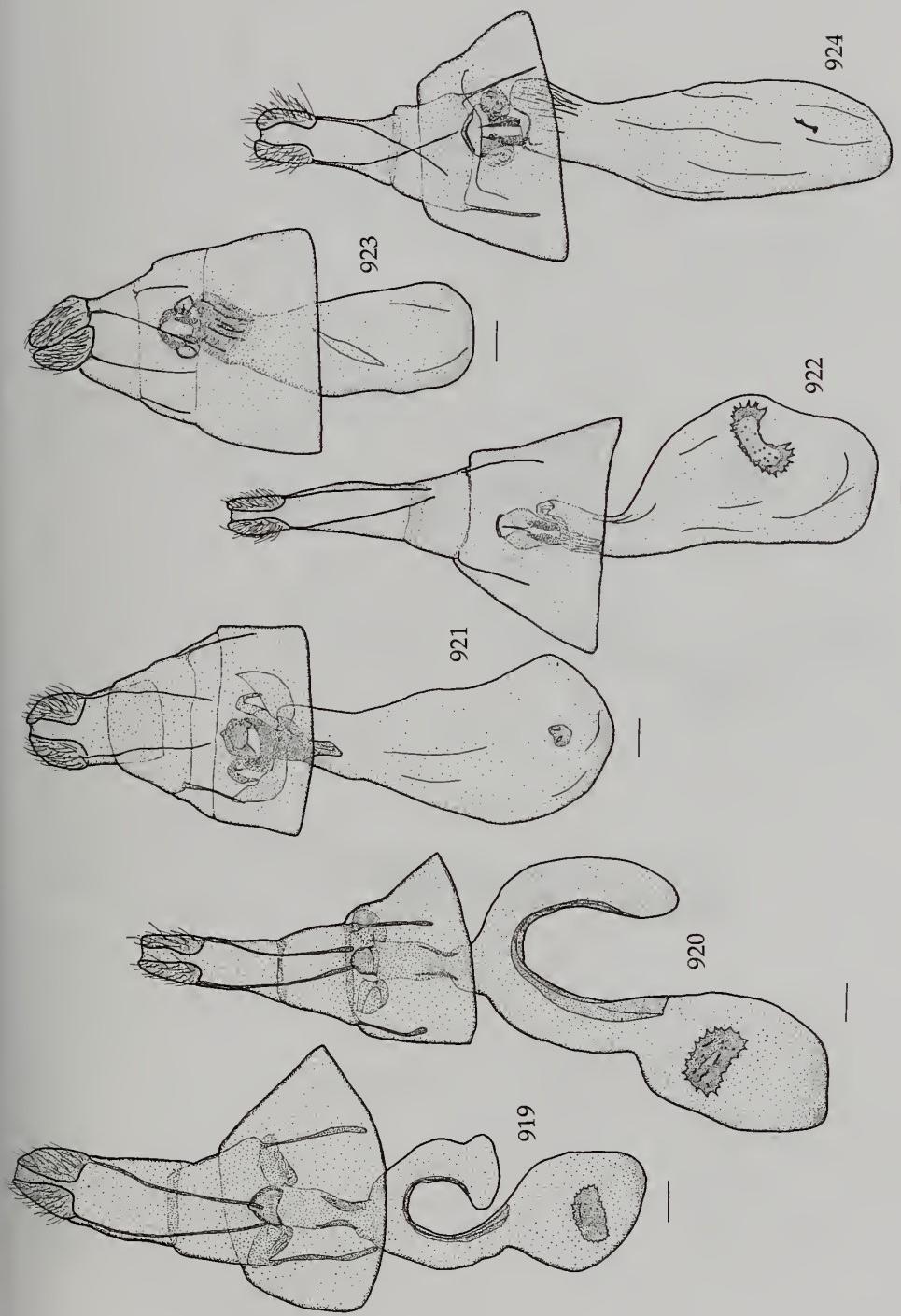
Figs 904-908. Female genitalia. 904, *Chiasmia contaminata* (Warren); 905, *C. lindemannae* (Fletcher); 906, *C. curvilineata* (Warren); 907, *C. simplicilnea* (Warren); 908, *C. affinis* (Warren). Scale-bar = 0.3 mm.



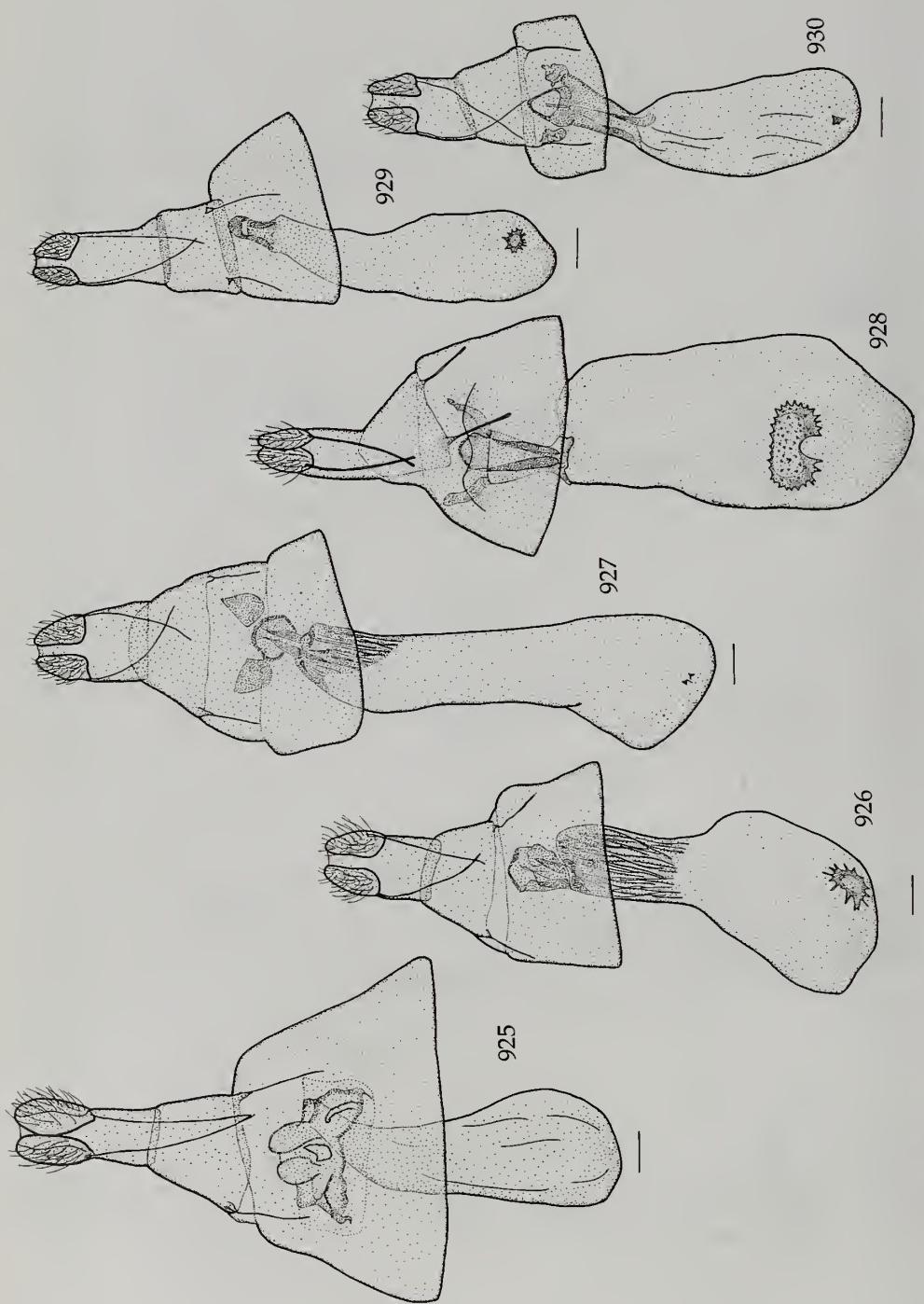
Figs 909-913. Female genitalia. 909, *Chiasmia fulvisparsa* (Warren); 910, *C. fulvimargo* (Warren); 911, *C. kilimanjarensis* (Holland); 912, *C. rectistrigaria* (Henrich-Schäffer); 913, *C. m. majestica* (Warren). Scale-bar = 0.3 mm.



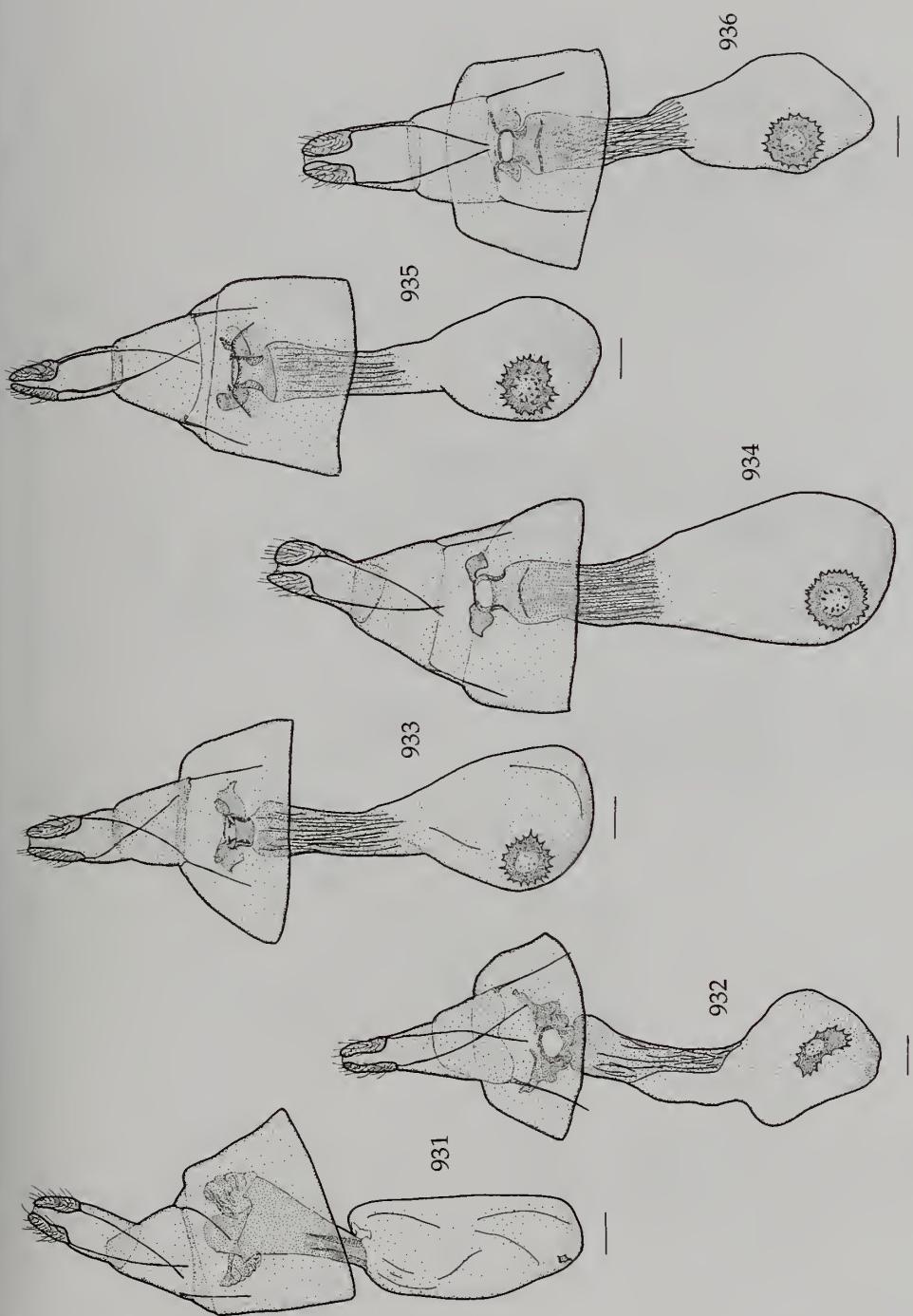
Figs 914–918. Female genitalia. 914, *Chiasmia avitusarioides* (Herbulot); 915, *C. m. multisirigata* (Warren); 916, *C. improcera* (Herbulot); 917, *C. zobrysi* sp. n.; 918, *C. curvifascia* (Warren). Scale-bar = 0.3 mm.



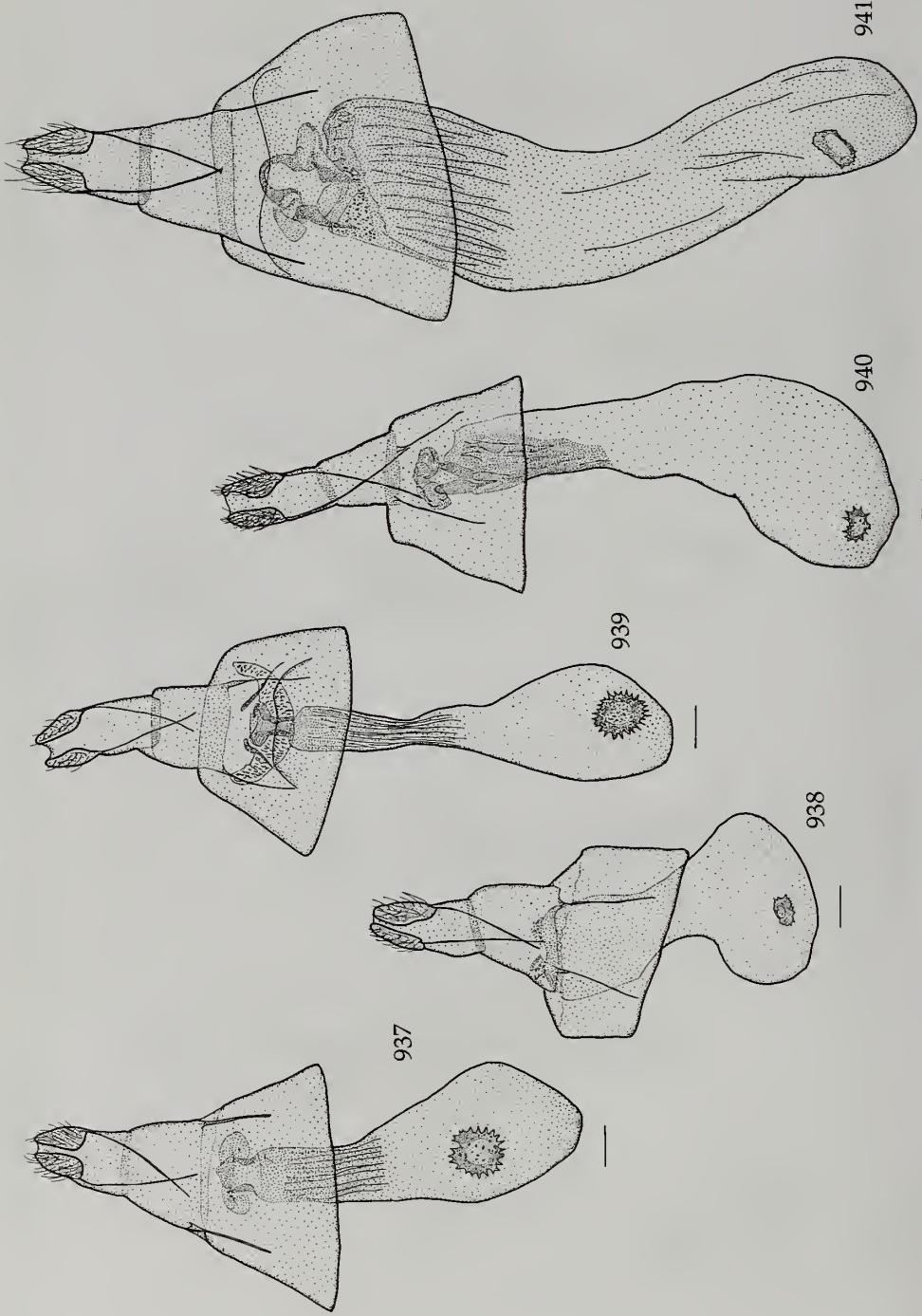
Rigs 919–924. Female genitalia. 919, *Chiasmia boarmioides* sp. n.; 920, *C. unifilata* (Warren); 921, *C. turbulenta* (Guenée); 922, *C. procidea semispurcata* (Walker); 923, *C. latimarginaria* (Rebel); 924, *C. warreni* (Prout). Scale-bar = 0.3 mm.



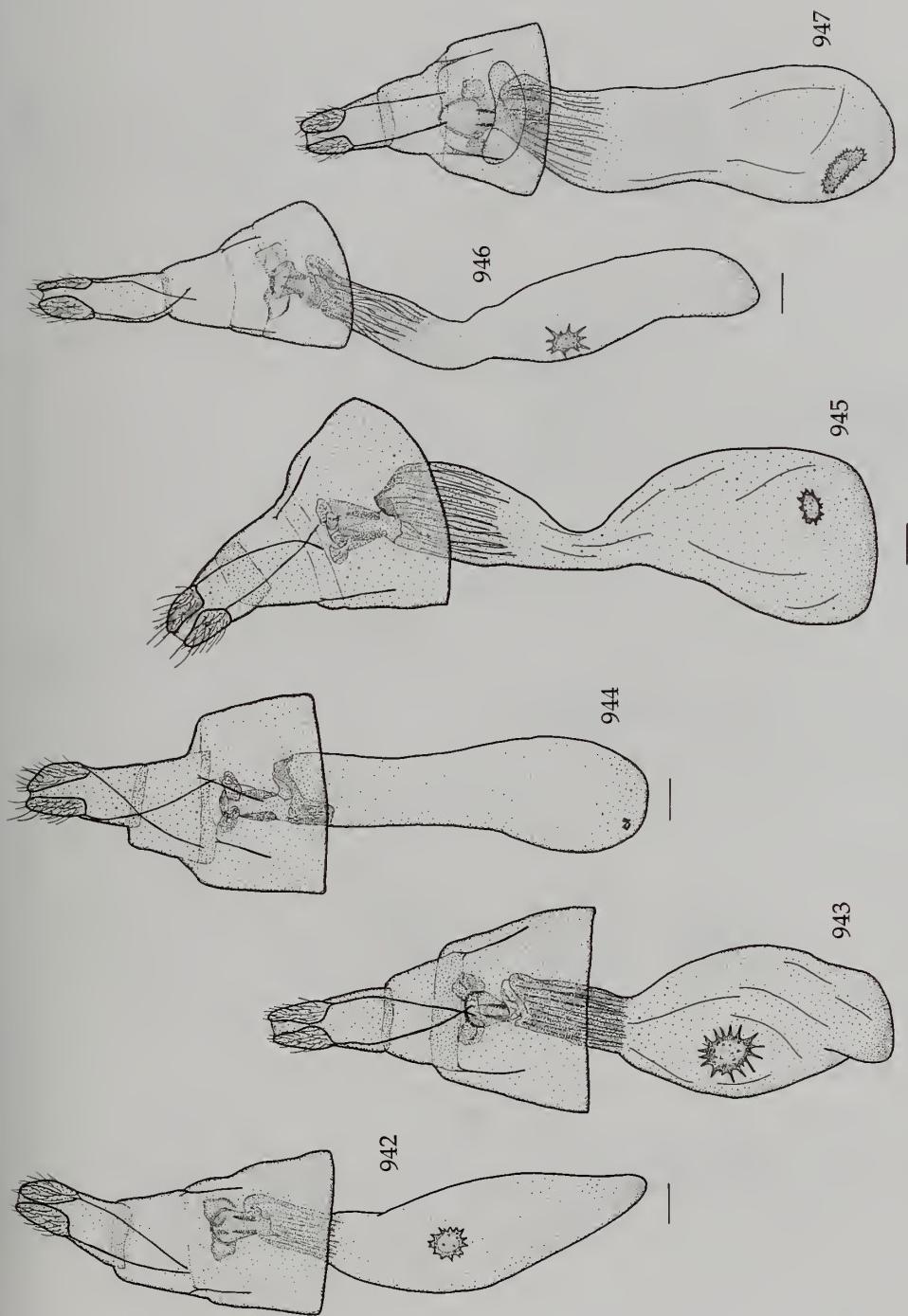
Figs 925–930. Female genitalia. 925, *Chiasmia peritittata* (Hampson); 926, *C. furcata* (Warren); 927, *C. inaequilinea* (Warren); 928, *C. butaria* (Swinhoe); 929, *C. grimma* (Wallengren); 930, *C. obsoleta* (Walker). Scale-bar = 0.3 mm.



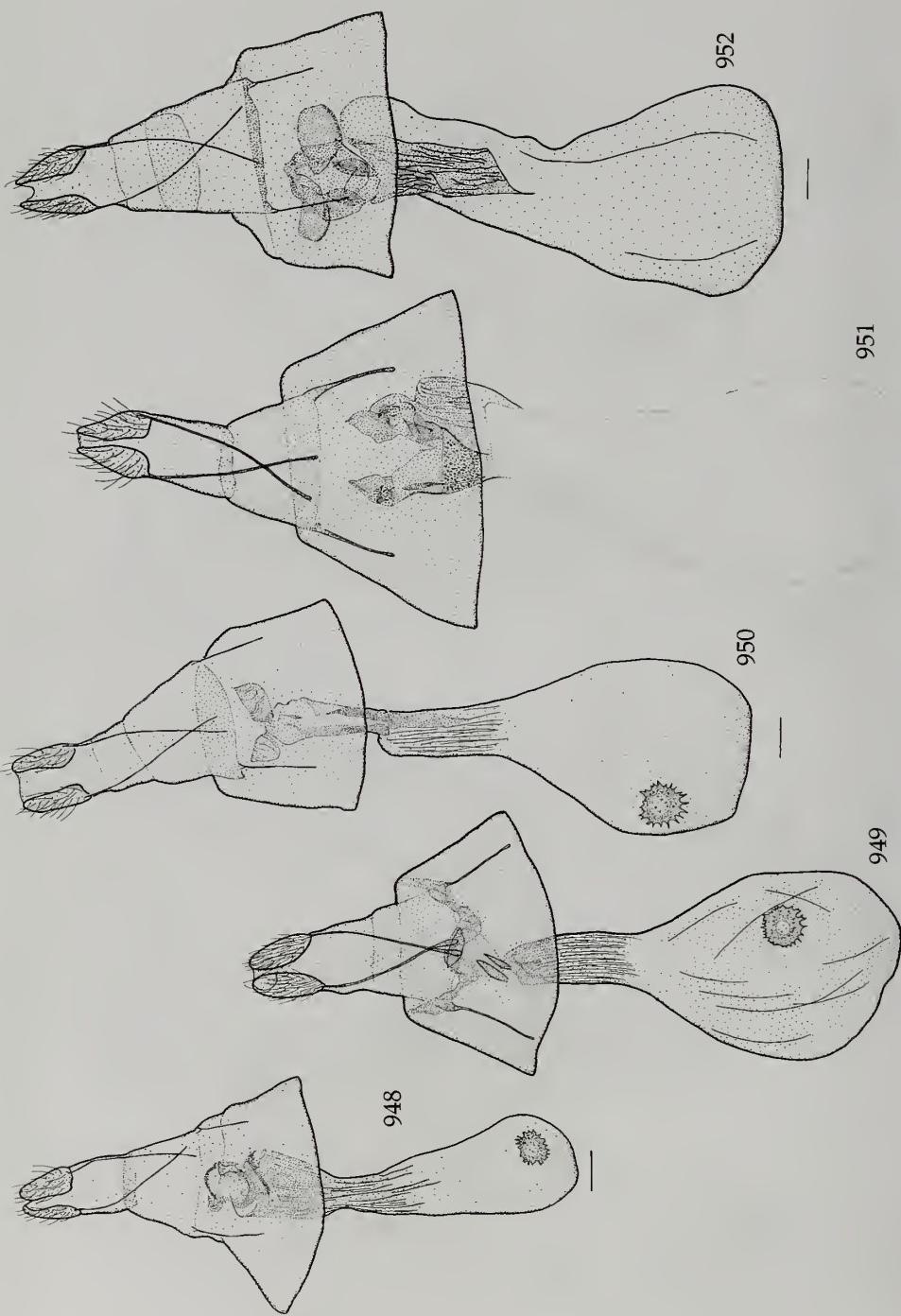
Figs 931-936. Female genitalia. 931, *Chiasmia* s. *subcurvaria* (Mabille); 932, *C. kirbyi* (Wallengren); 933, *C. vaut* (Prout); 934, *C. morogoro* sp. n.; 935, *C. crassata* (Warren); 936, *C. semiolivacea* sp. n. Scale-bar = 0.3 mm.



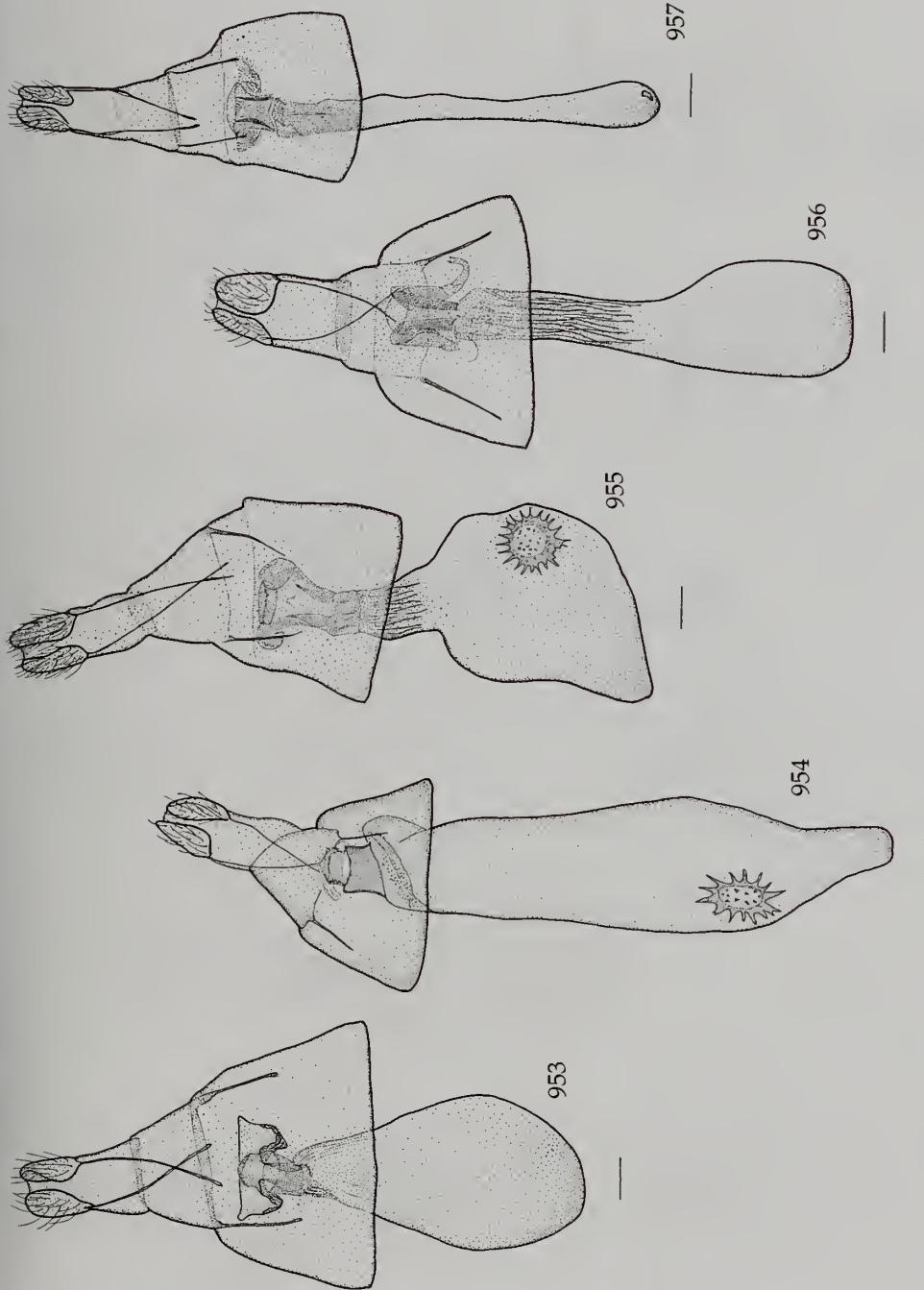
Figs 937-941. Female genitalia. 937, *Chiastmia punctilinea* (Proust); 938, *C. dentilineata* (Warren); 939, *C. costicomata* (Proust); 940, *C. bromusaria* (Walker); 941, *C. imitatrix* sp. n. Scale-bar = 0.3 mm.



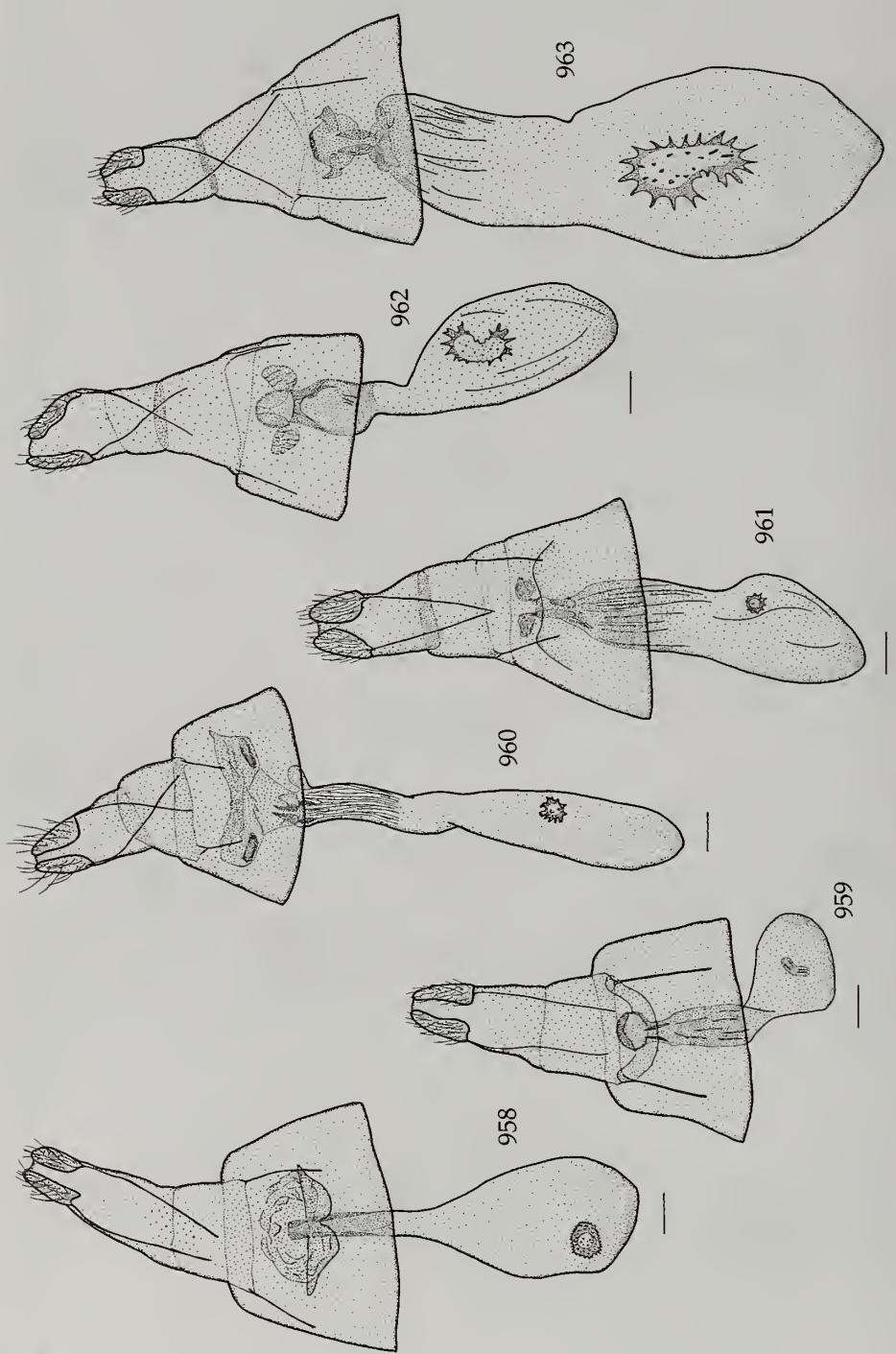
Figs 942-947. Female genitalia: 942, *Chiasmia sudanata* (Warren & Rothschild); 943, *C. senegalensis* sp. n.; 944, *C. tristis* sp. n.; 945, *C. castanea* sp. n.; 946, *C. i. inconspicua* (Warren); 947, *C. androphoba* sp. n. Scale-bar = 0.3 mm.



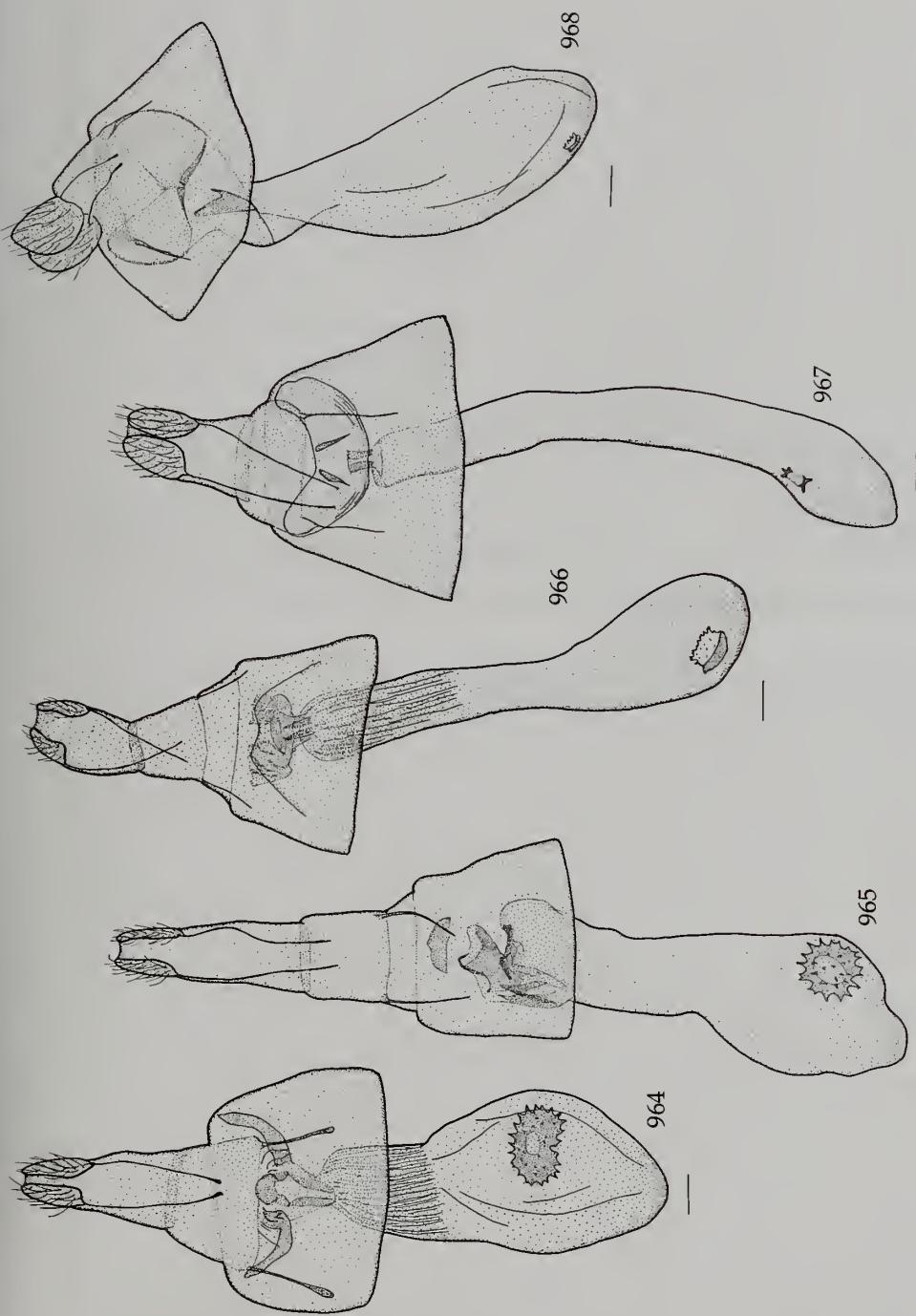
Figs 948–952. Female genitalia. 948, *Chiasmia assimilis* (Warren); 949, *C. maculosa* (Warren); 950, *C. ammodes* (Prout); 951, *C. olindaria* (Swinhoe); 952, *C. suniensis* (Strand). Scale-bar = 0.3 mm.



Figs 953-957. Female genitalia. 953, *Chiasmia trizonaria* (Prout); 954, *C. c. clathrata* (Linnaeus); 955, *C. umbratilis* (Butler); 956, *C. marmorata* (Warren); 957, *C. semialbida* (Prout).  
Scale-bar = 0.3 mm.



Figs 958-963. Female genitalia. 958, *Chiasmia obliquilineata* (Warren); 959, *C. interrupta* (Warren); 960, *C. abnormata* (Prout); 961, *C. angulifera* (Prout); 962, *C. arenosa* (Butler); 963, *C. genula* (Wallengren). Scale-bar = 0.3 mm.



Figs 964-968. Female genitalia: 964, *Chiasmia giliura* (Prout); 965, *C. nana* (Warren); 966, *C. normata* (Walker); 967, 'Semiothisa' peyterasi (Vieite); 968, *Malgassothisa trifida* Herbulot. Scale-bar = 0.3 mm.

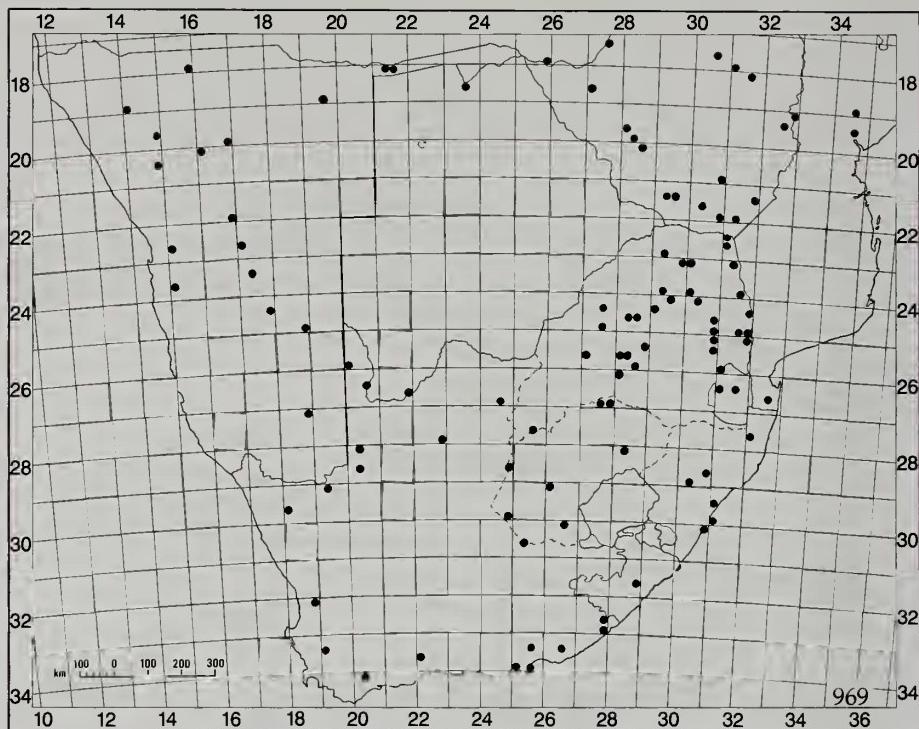


Fig. 969. Southern African distribution of *Acanthovalva inconspicuaria* (Hübner).

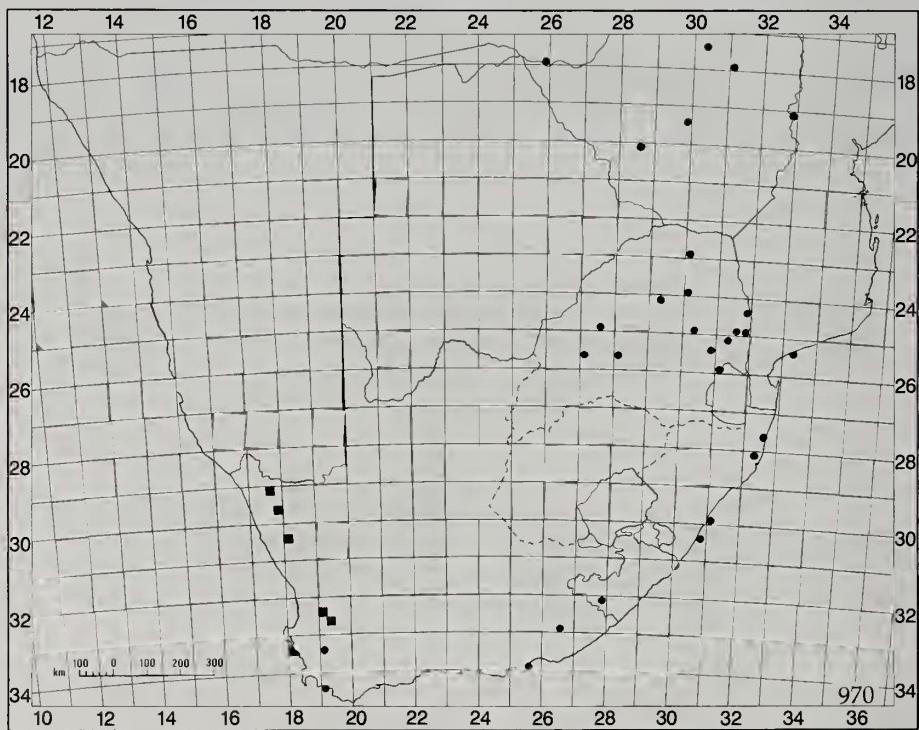


Fig. 970. Southern African distribution of *Acanthovalva capensis* sp. n. (●) and *A. bilineata* (Warren) (■).

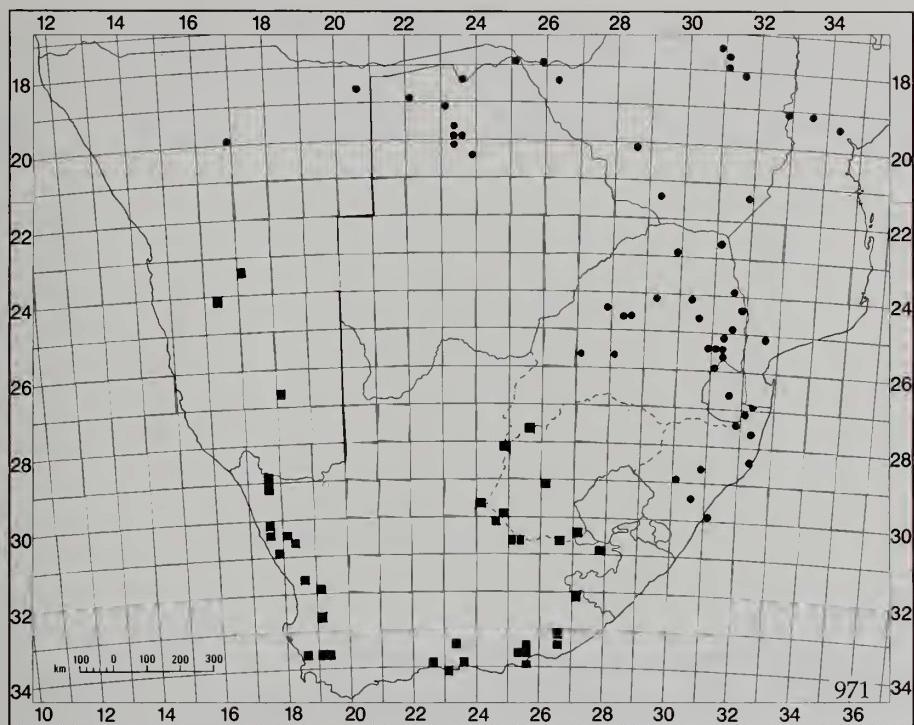


Fig. 971. Southern African distribution of *Acanthovalva focularia* (Geyer) (■) and *Plateoplia acrobelia* (Wallengren) (●).

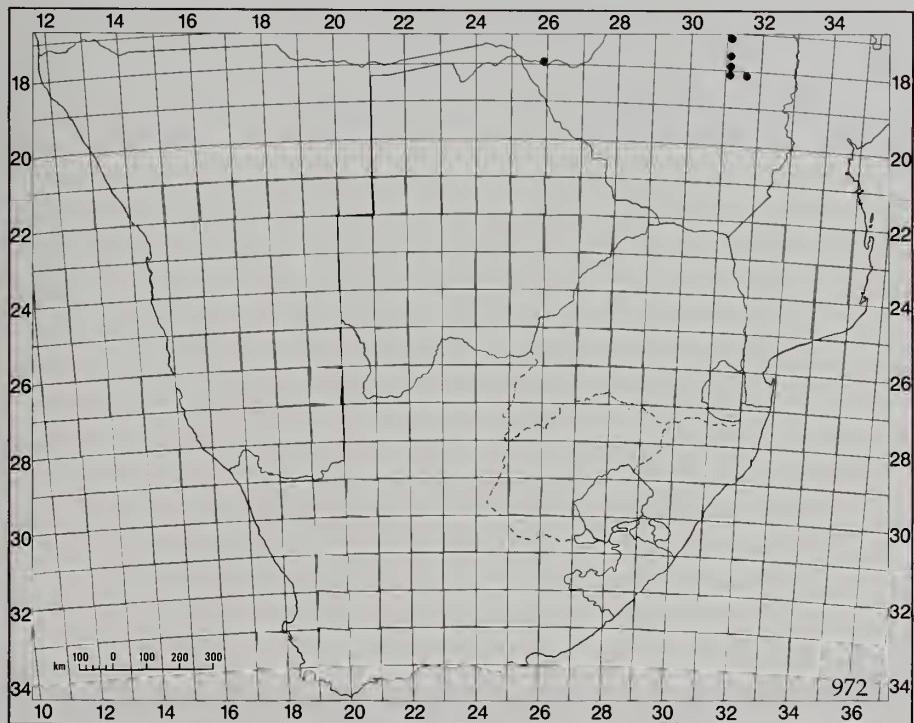


Fig. 972. Southern African distribution of *Milocera aurora* sp. n.

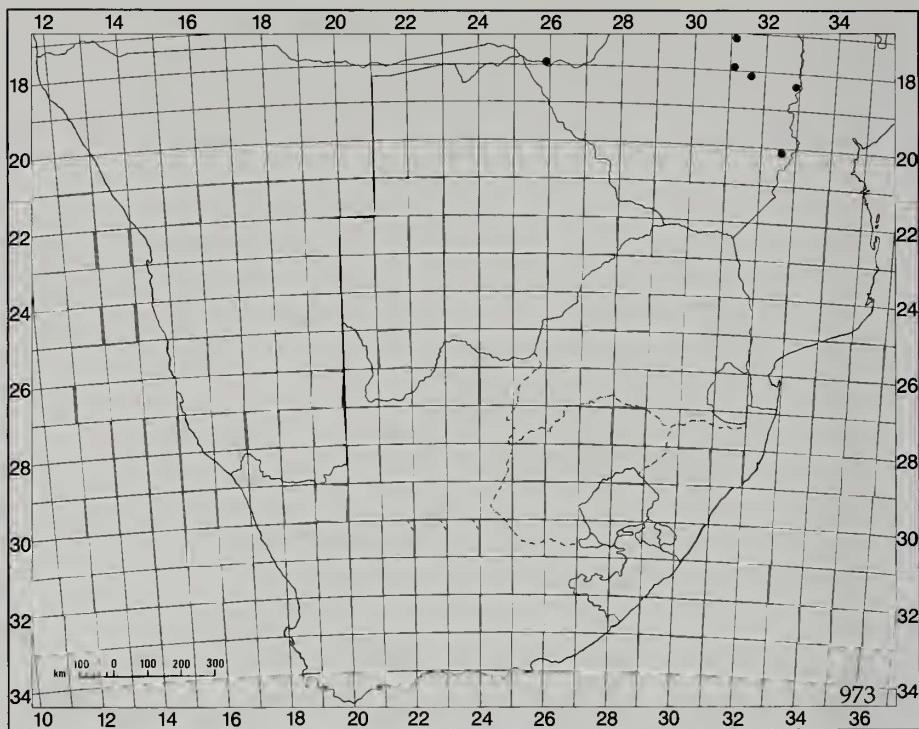


Fig. 973. Southern African distribution of *Milocera dubia* Prout.

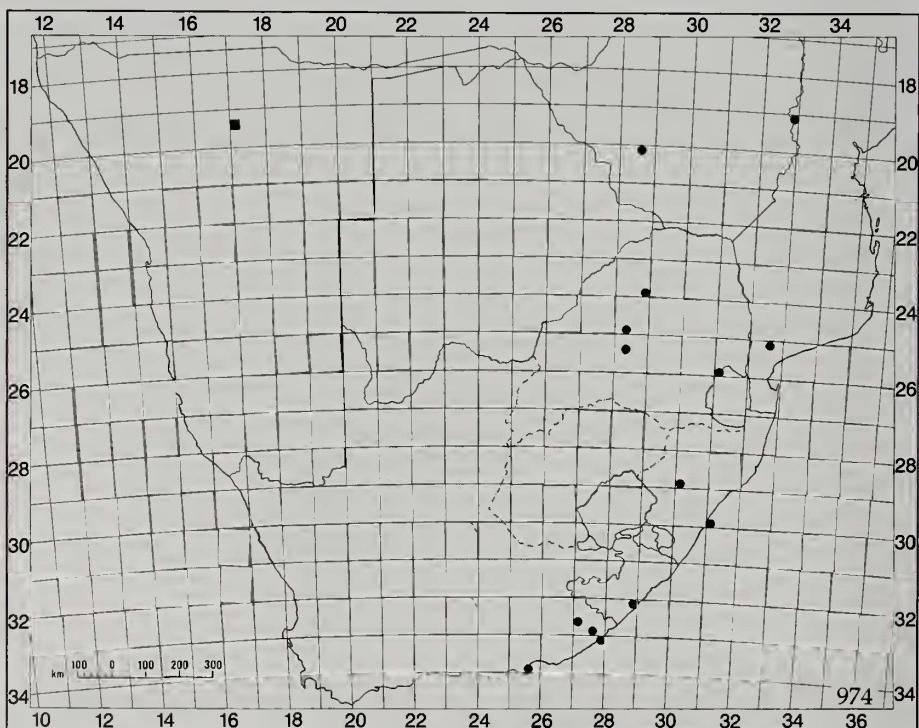


Fig. 974. Southern African distribution of *Platypepla spurcata* (Warren) (●) and *P. jordani* sp. n. (■).

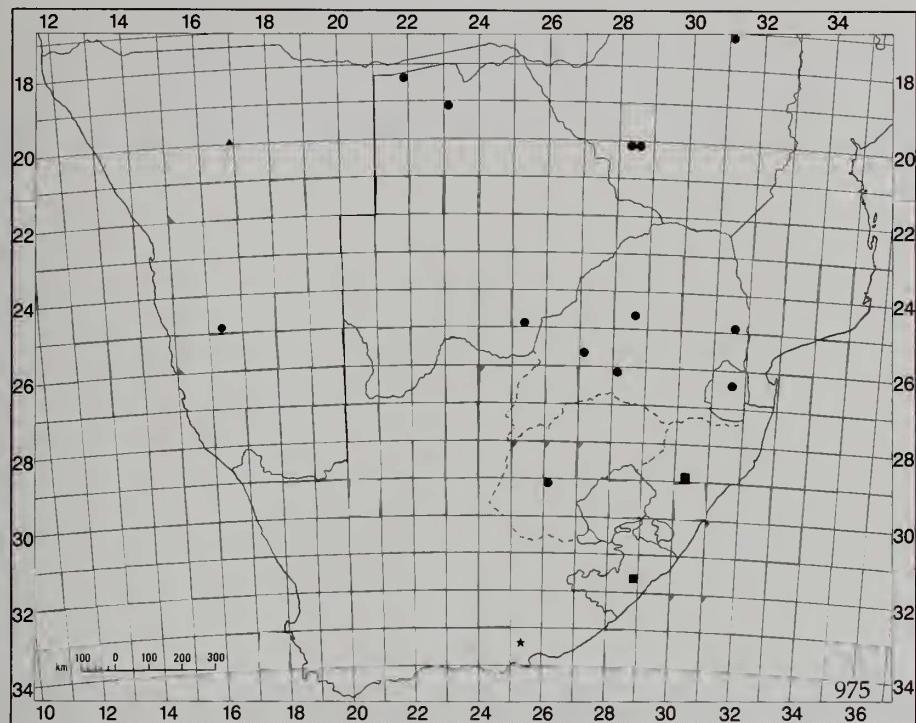


Fig. 975. Southern African distribution of *Platypepla loranthiphaga* sp. n. (▲), *P. macilenta* sp. n. (■), *P. persubtilis* sp. n. (●) and *P. mackayi* sp. n. (\*).

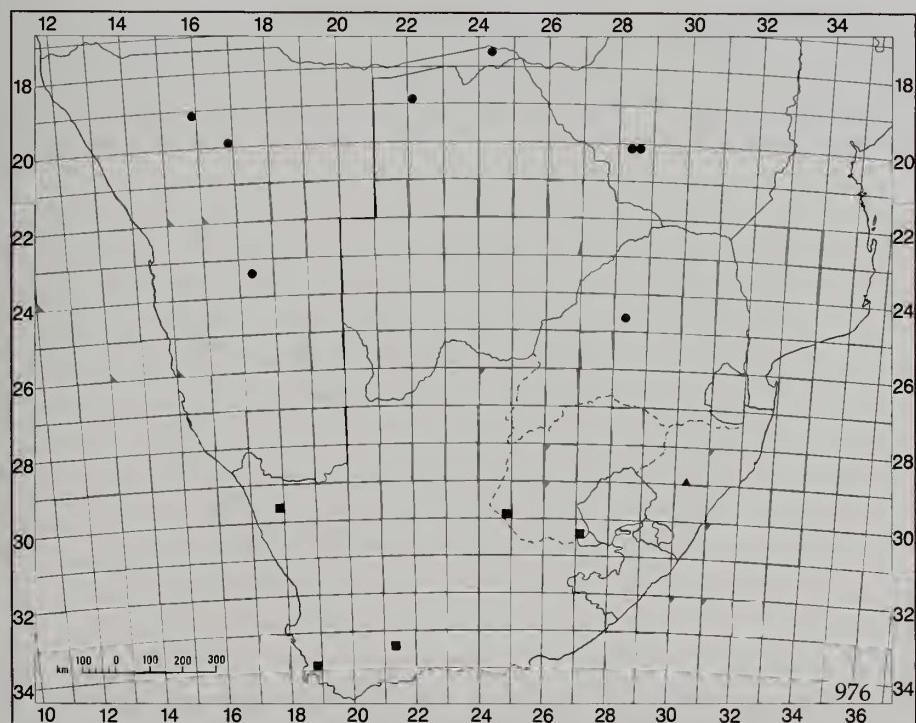


Fig. 976. Southern African distribution of *Platypepla griseobrunnea* sp. n. (■), *P. flava* sp. n. (●) and *P. pseudospurcata* sp. n. (▲).

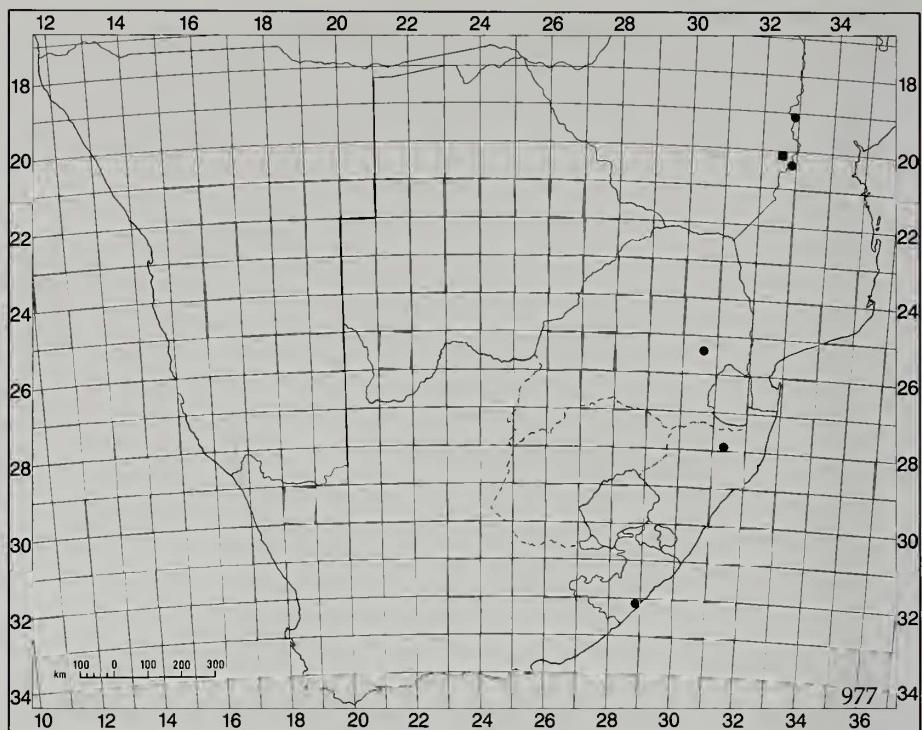


Fig. 977. Southern African distribution of *Chelotephrina acorema* sp. n. (●) and *Isturgia perplexa* sp. n. (■).

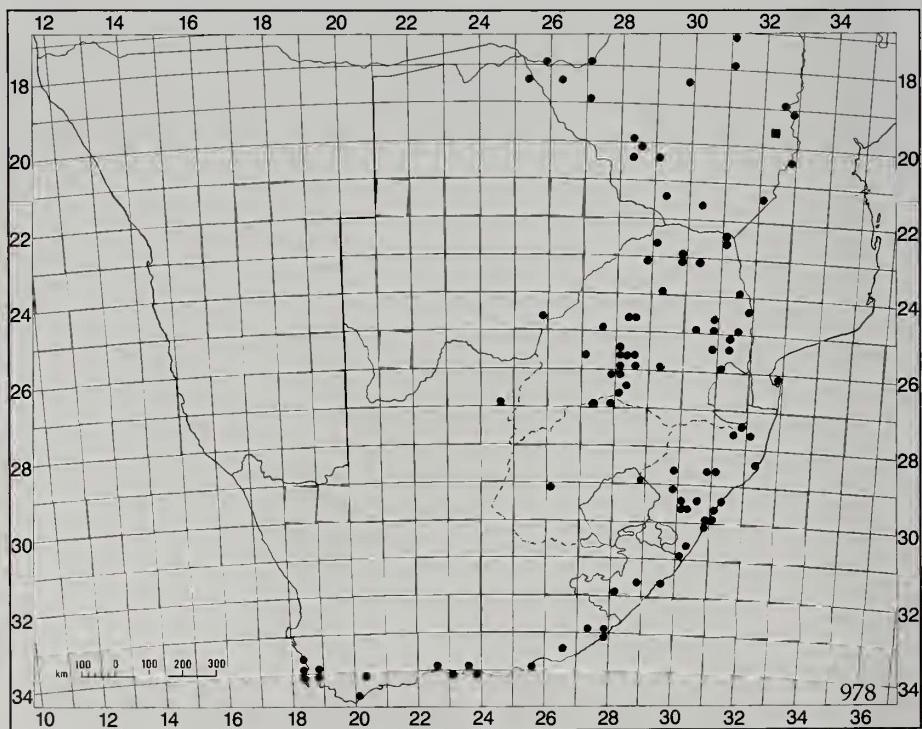


Fig. 978. Southern African distribution of *Isturgia catalaunaria* (Guenée) (●) and *I. triseriata* (Prout) (■).

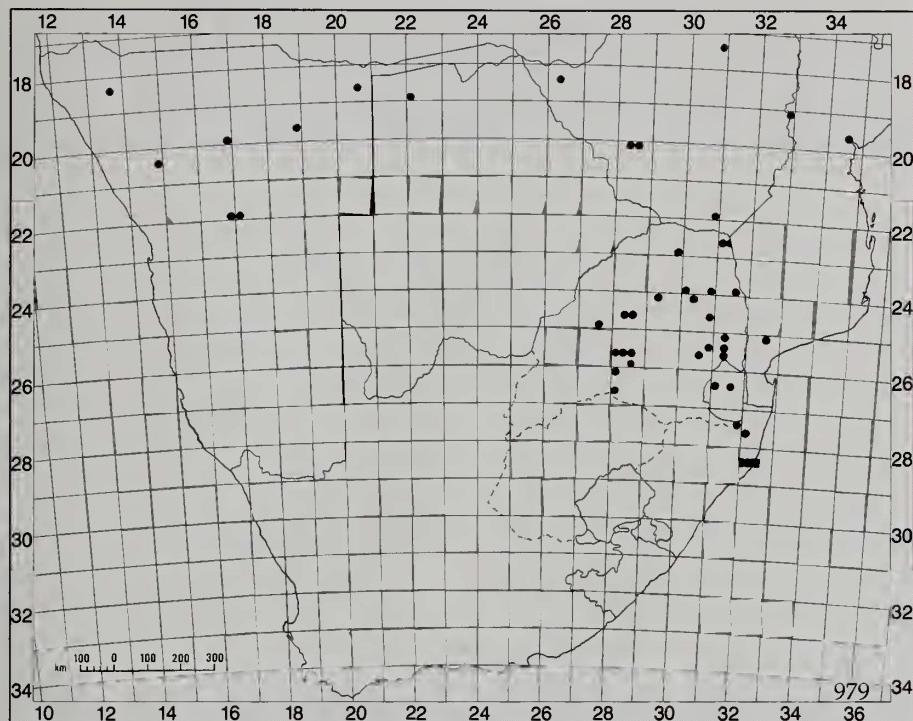


Fig. 979. Southern African distribution of *Isturgia dukuduku* sp. n. (■) and *I. supergressa* (Prout) (●).

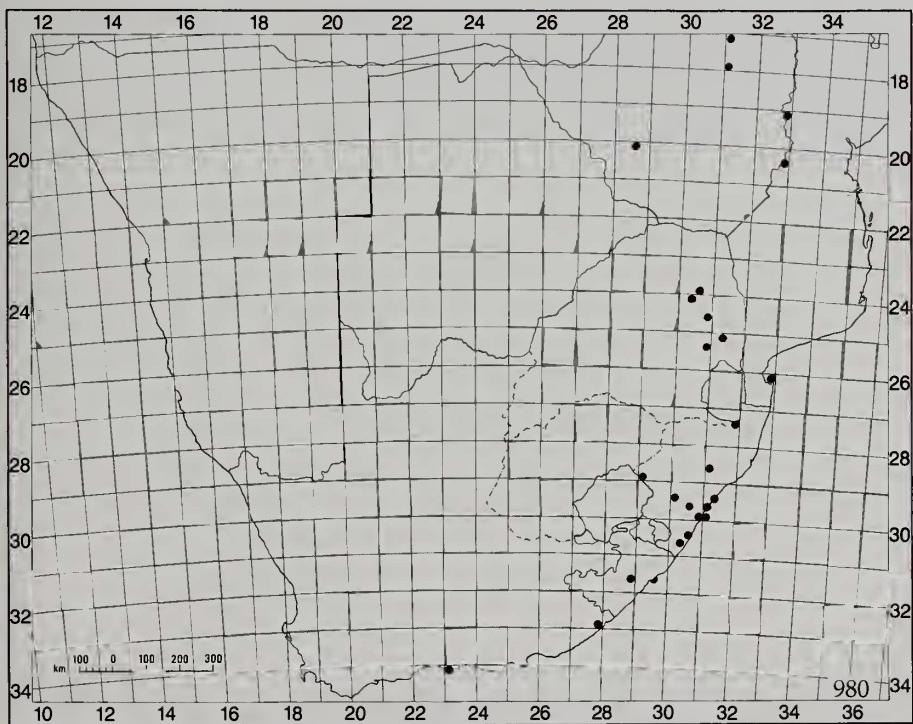


Fig. 980. Southern African distribution of *Isturgia exospilata* (Walker).

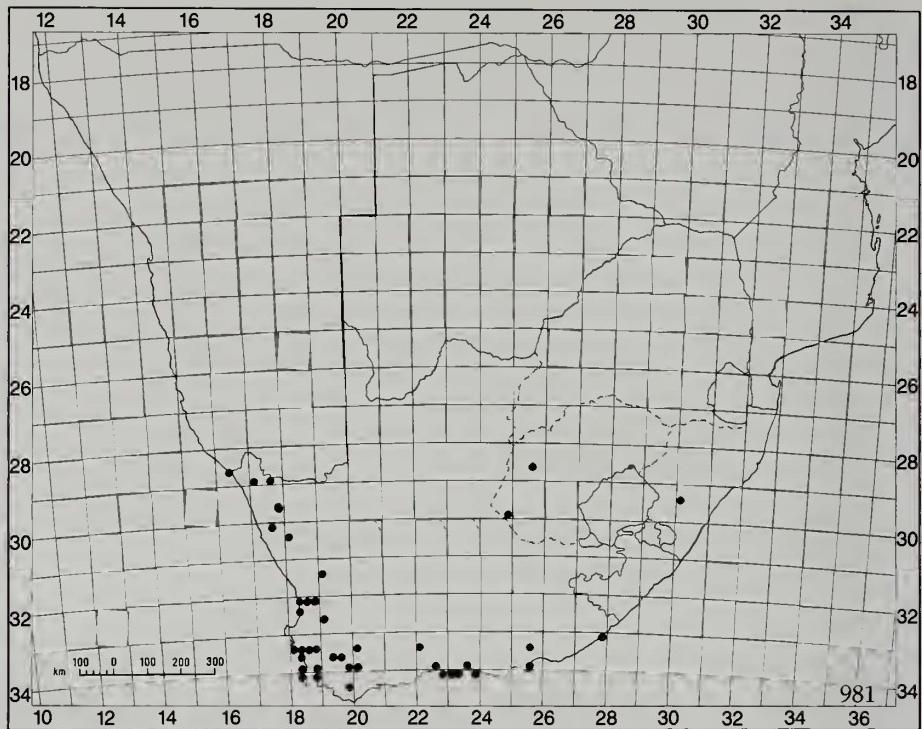


Fig. 981. Southern African distribution of *Isturgia exerraria* (Prout).

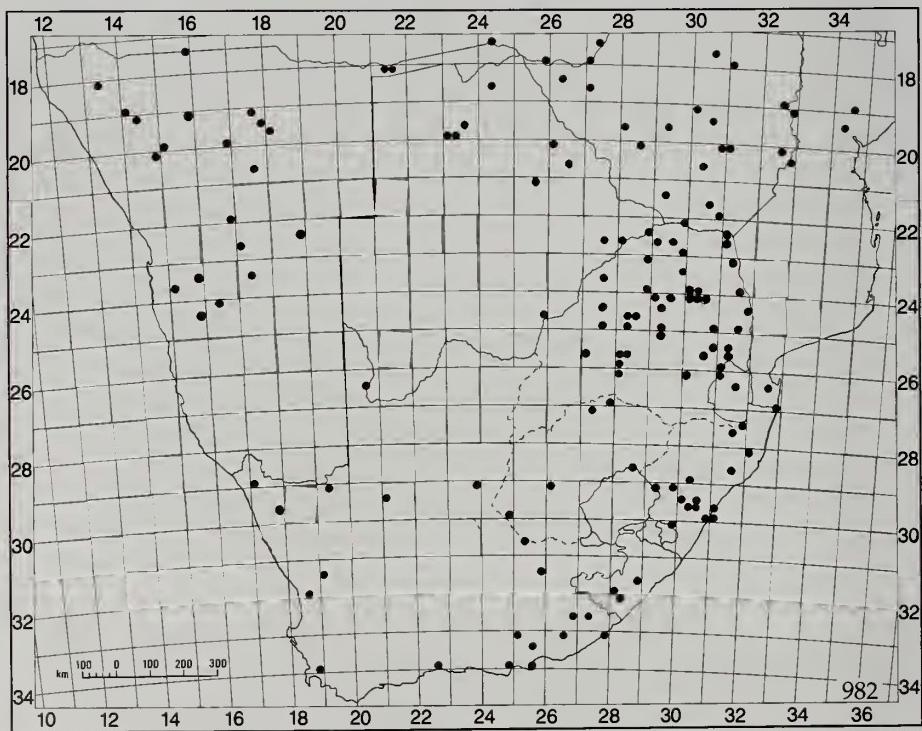


Fig. 982. Southern African distribution of *Isturgia deerraria* (Walker).

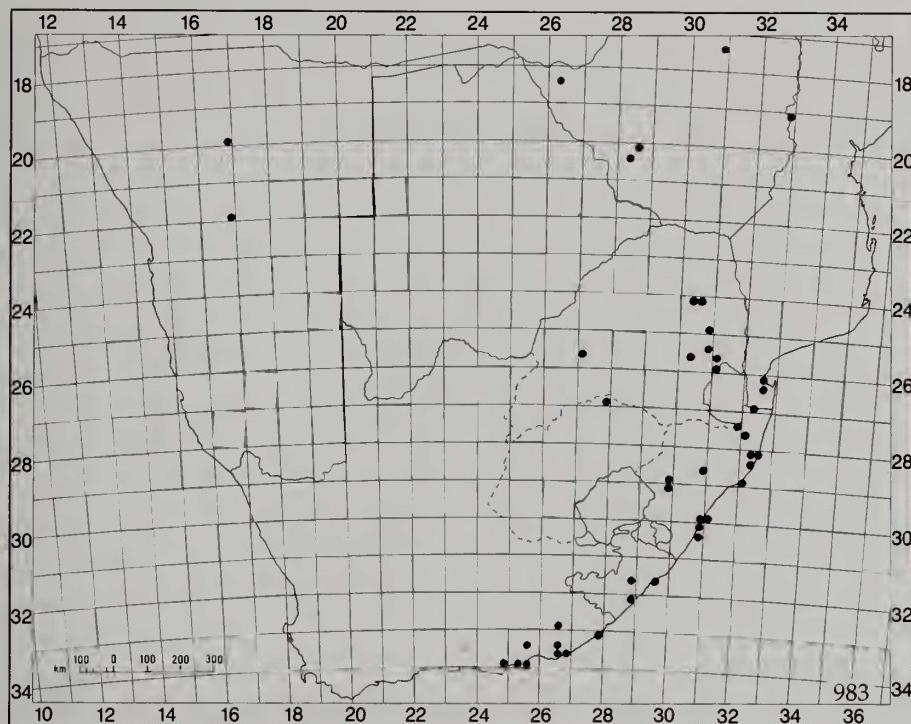


Fig. 983. Southern African distribution of *Isturgia spissata* (Walker).

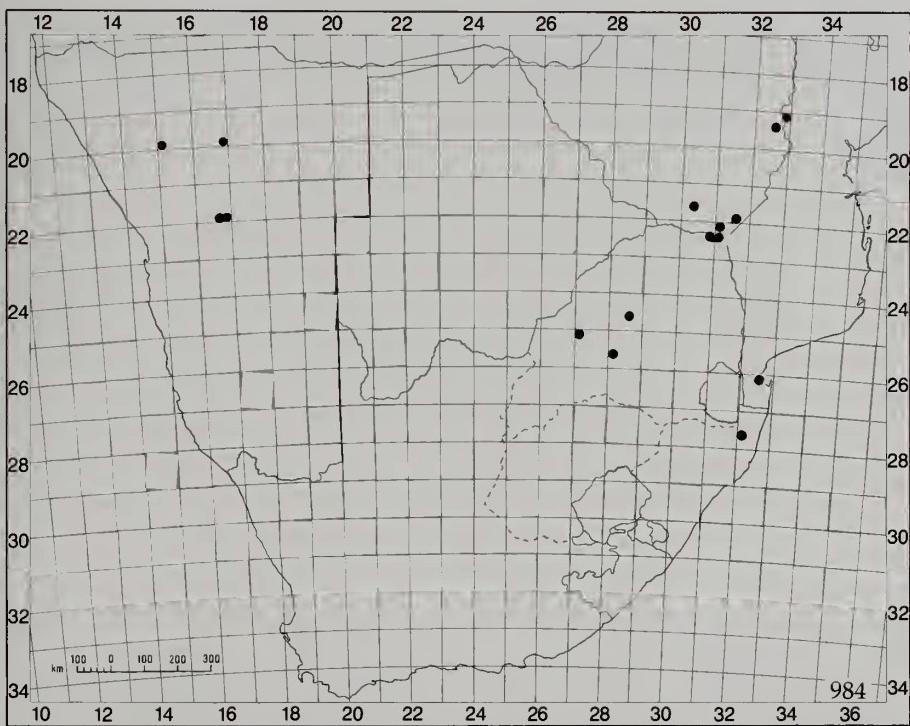


Fig. 984. Southern African distribution of *Isturgia arizeloides* sp. n.

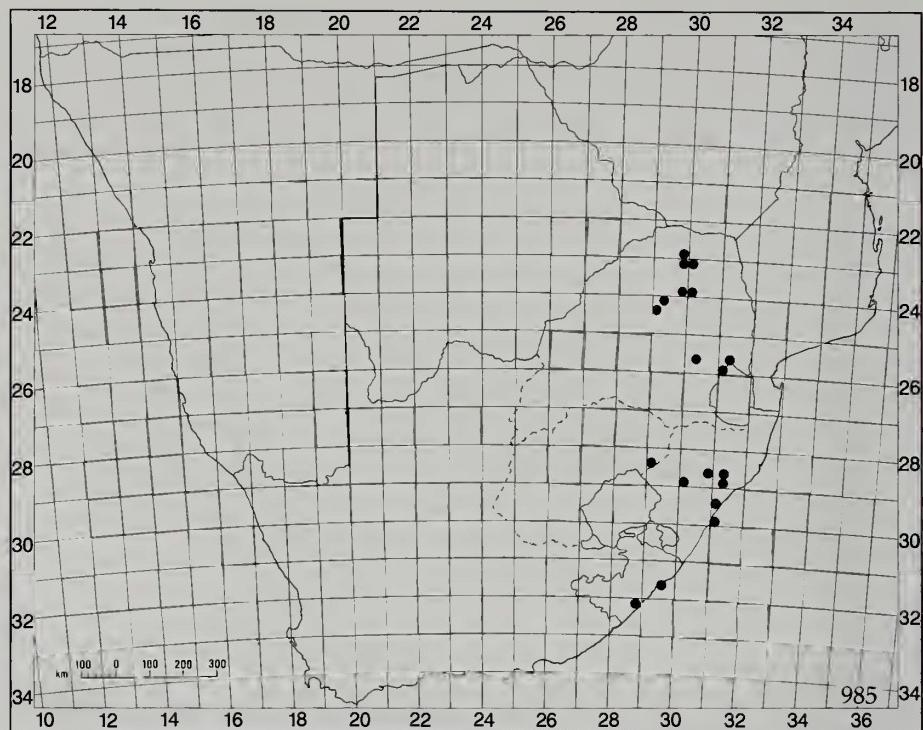


Fig. 985. Southern African distribution of *Isturgia geminata* (Warren).

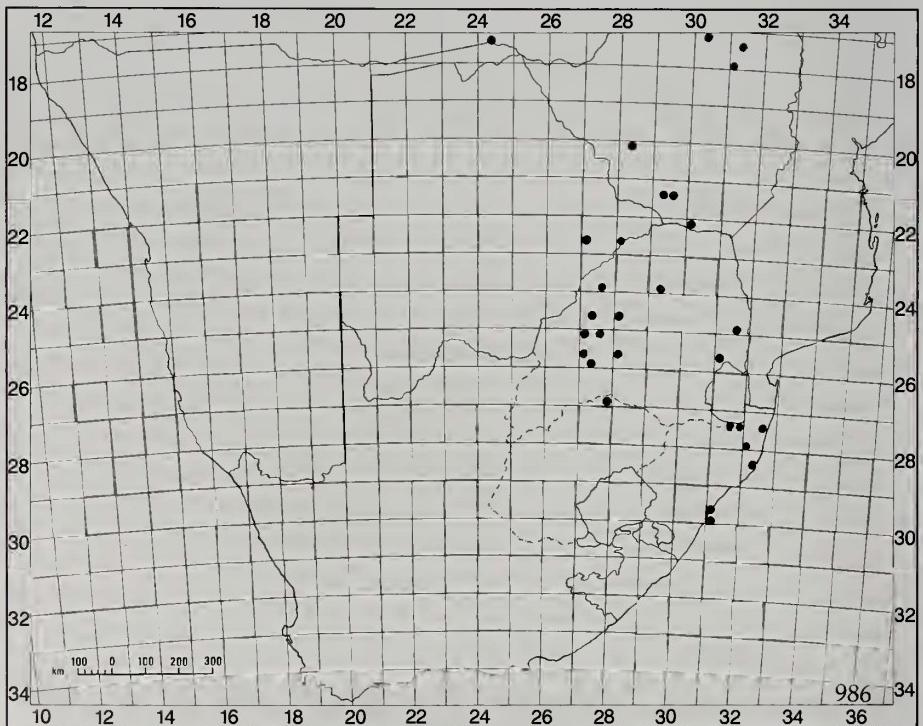


Fig. 986. Southern African distribution of *Chiasmia tecnium* (Prout).

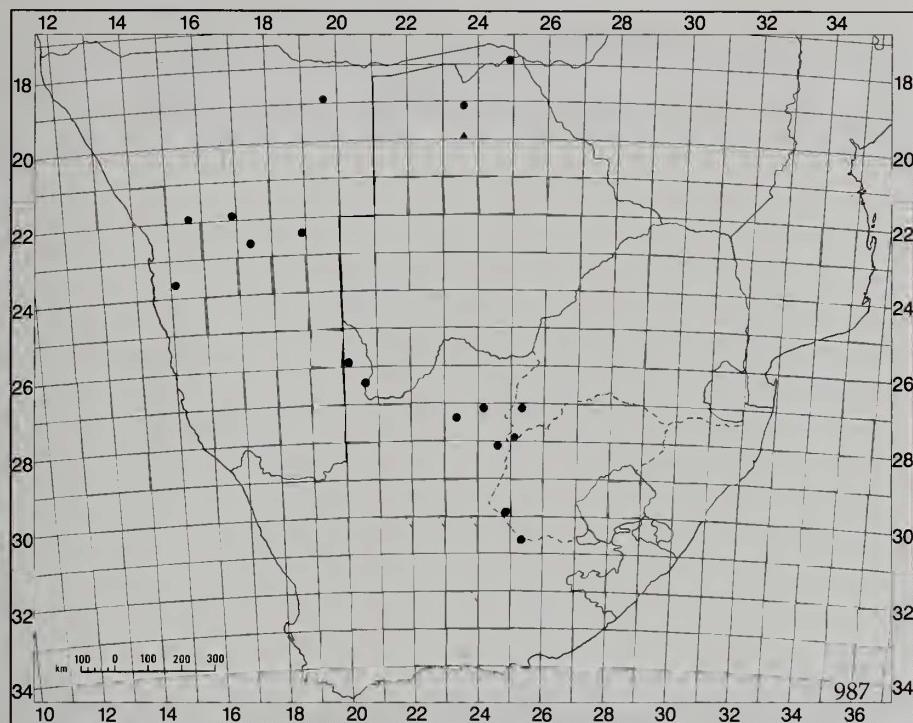


Fig. 987. Southern African distribution of *Chiasmia diarmodia* (Prout) (●) and *C. ngami* sp. n. (▲).

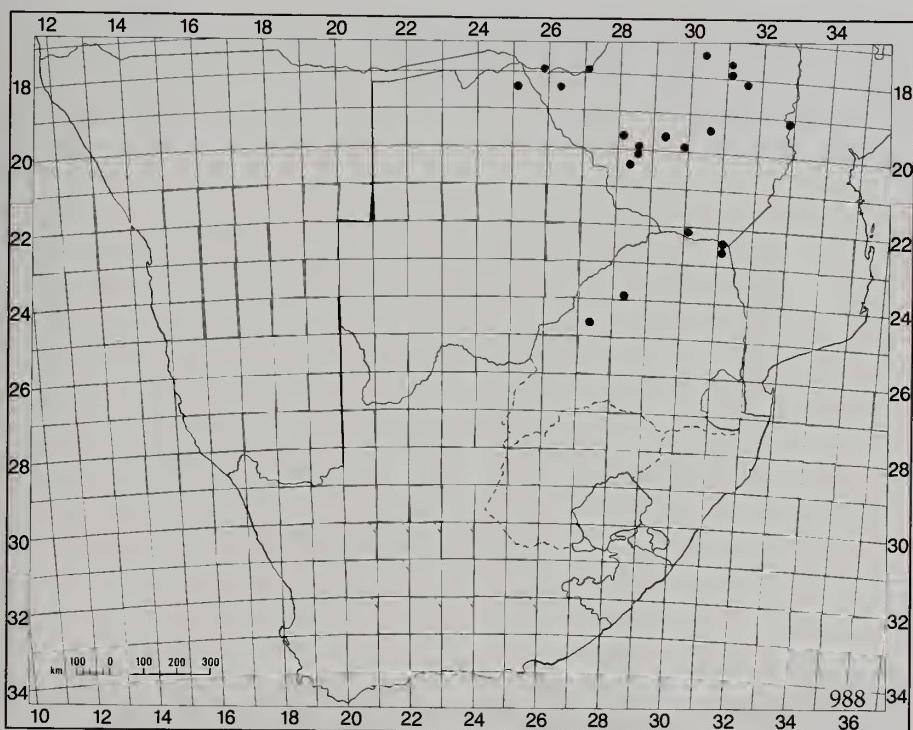


Fig. 988. Southern African distribution of *Chiasmia nubilata* (Warren).

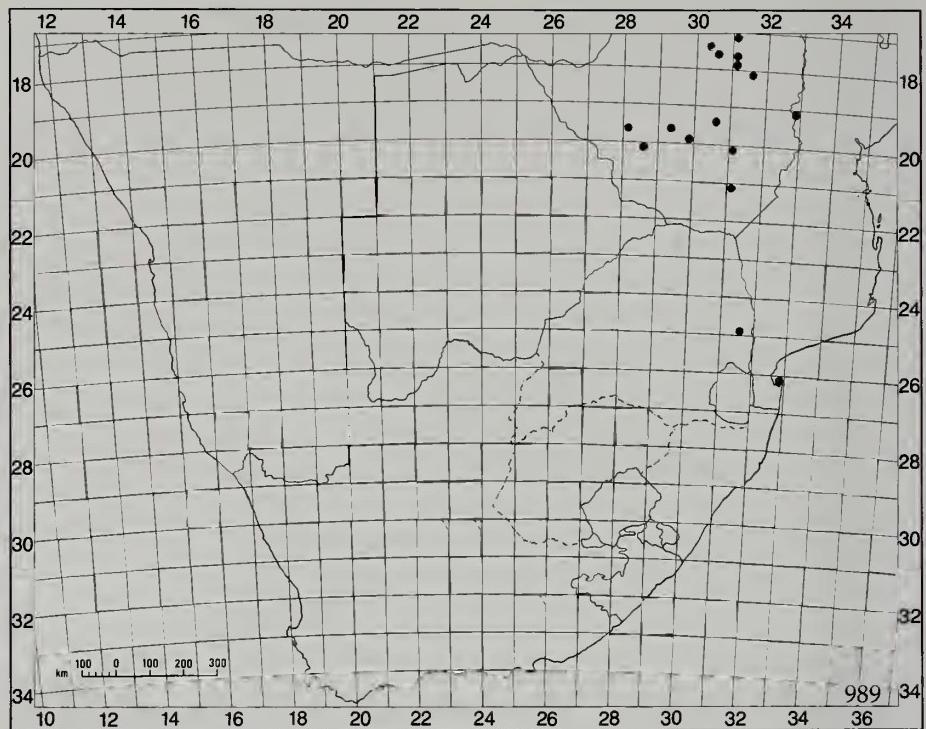


Fig. 989. Southern African distribution of *Chiasmia extrusilinea* (Warren).

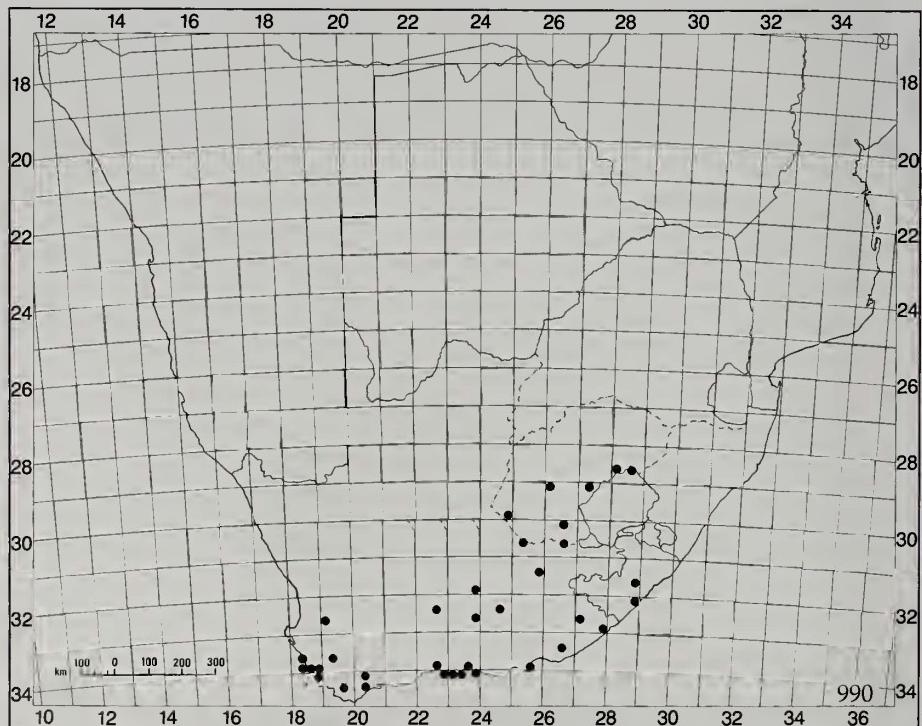


Fig. 990. Southern African distribution of *Chiasmia semitecta* (Walker).

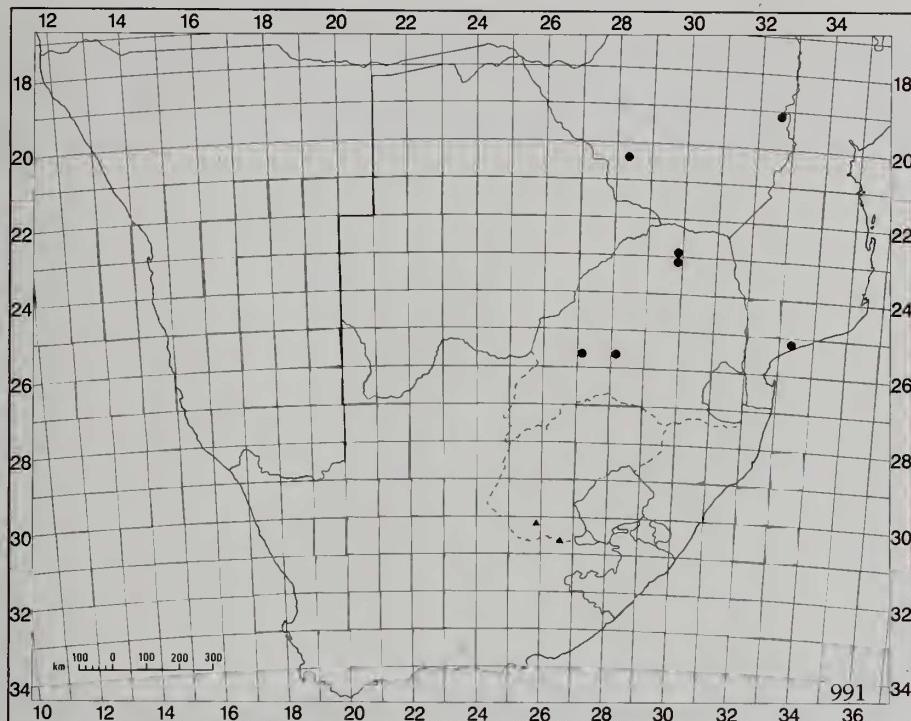


Fig. 991. Southern African distribution of *Chiasmia brunnescens* sp. n. (▲) and *C. grisescens* (Prout) (●).

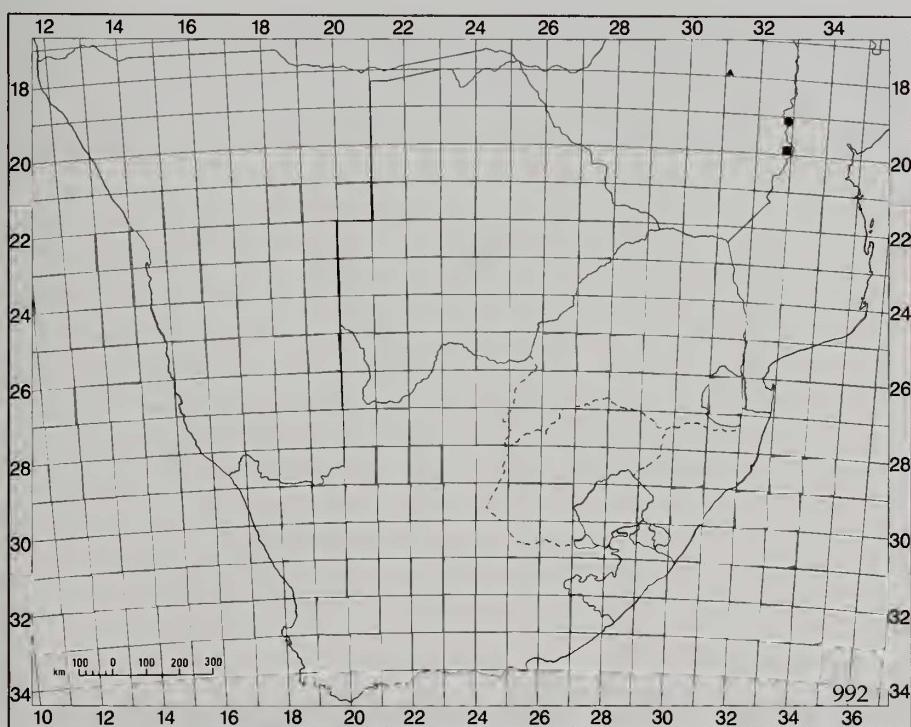


Fig. 992. Southern African distribution of *Chiasmia murina* sp. n. (●), *C. hunyani* sp. n. (▲) and *C. melsetter* sp. n. (■).

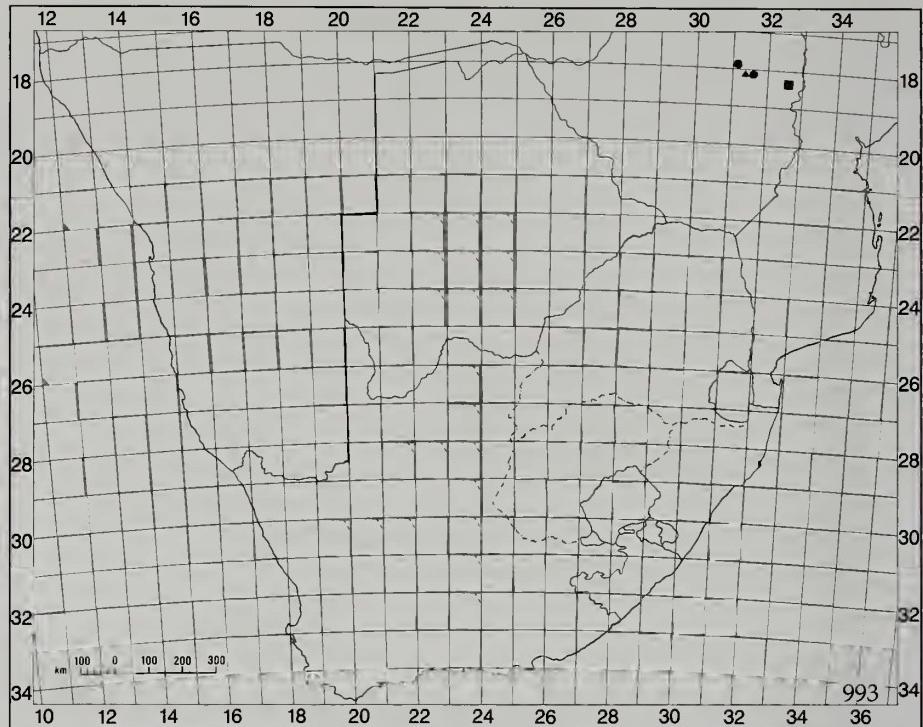


Fig. 993. Southern African distribution of *Chiasmia bomfordi* sp. n. (●), *C. pinheyi* sp. n. (■) and *C. deleta* sp. n. (▲).

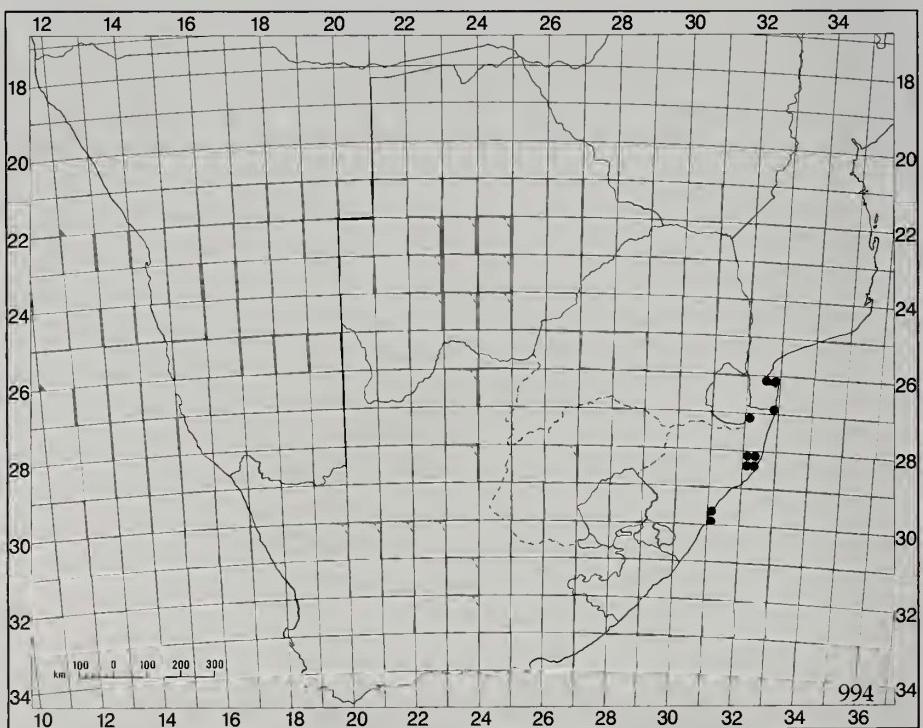


Fig. 994. Southern African distribution of *Chiasmia alternata* (Warren).

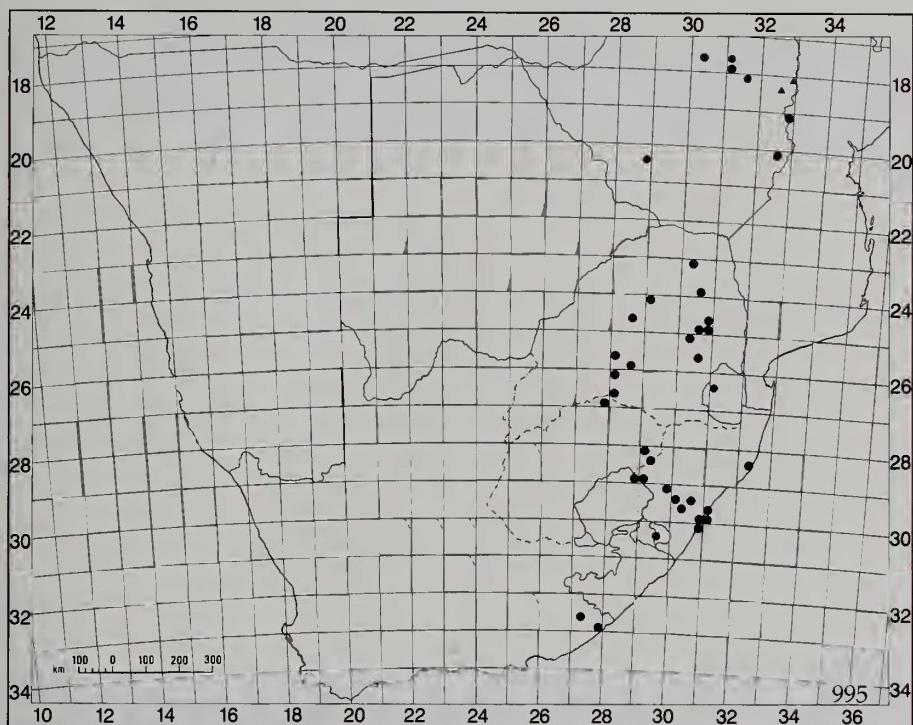


Fig. 995. Southern African distribution of *Chiasmia johnstoni* (Butler) (●) and *C. semicolor* (Warren) (▲).

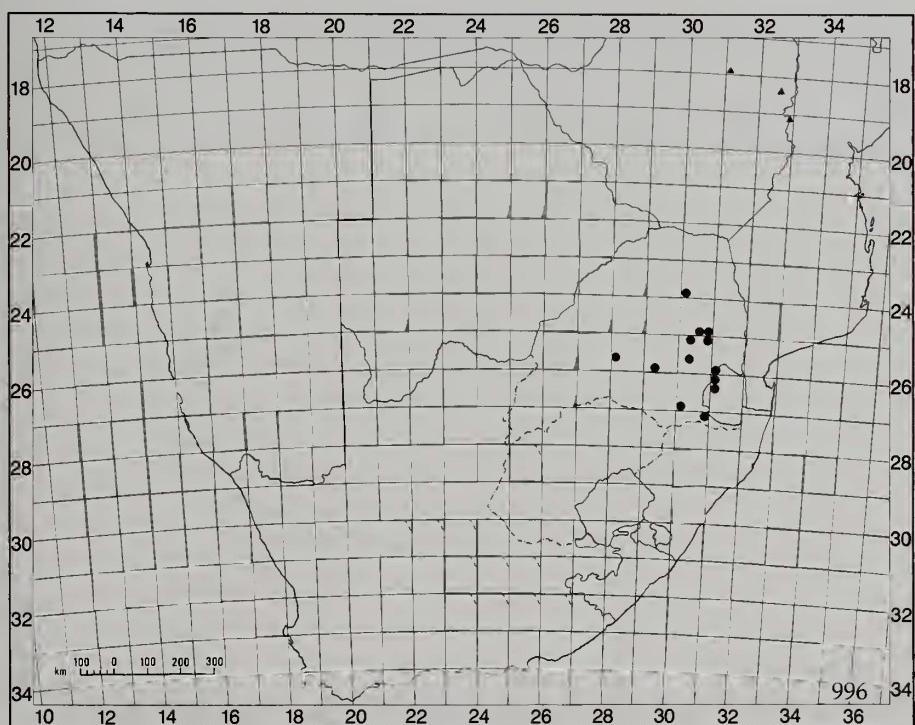


Fig. 996. Southern African distribution of *Chiasmia rhabdophora* (Holland) (▲) and *C. nobilitata* (Prout) (●).

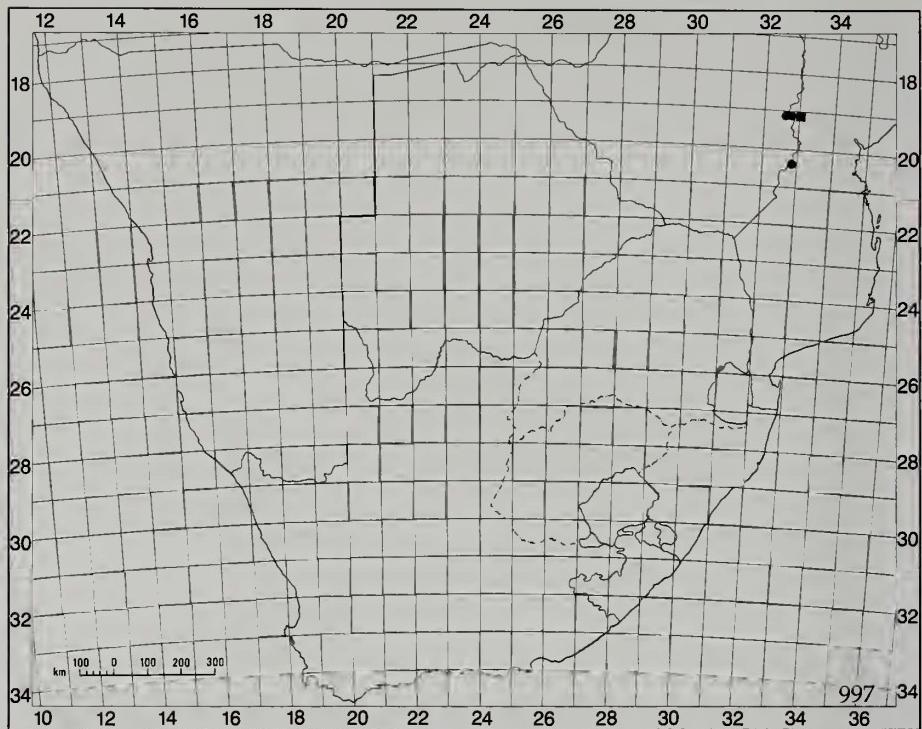


Fig. 997. Southern African distribution of *Chiasmia infabricata* (Prout) (●) and *C. nevilledukei* sp. n. (■).

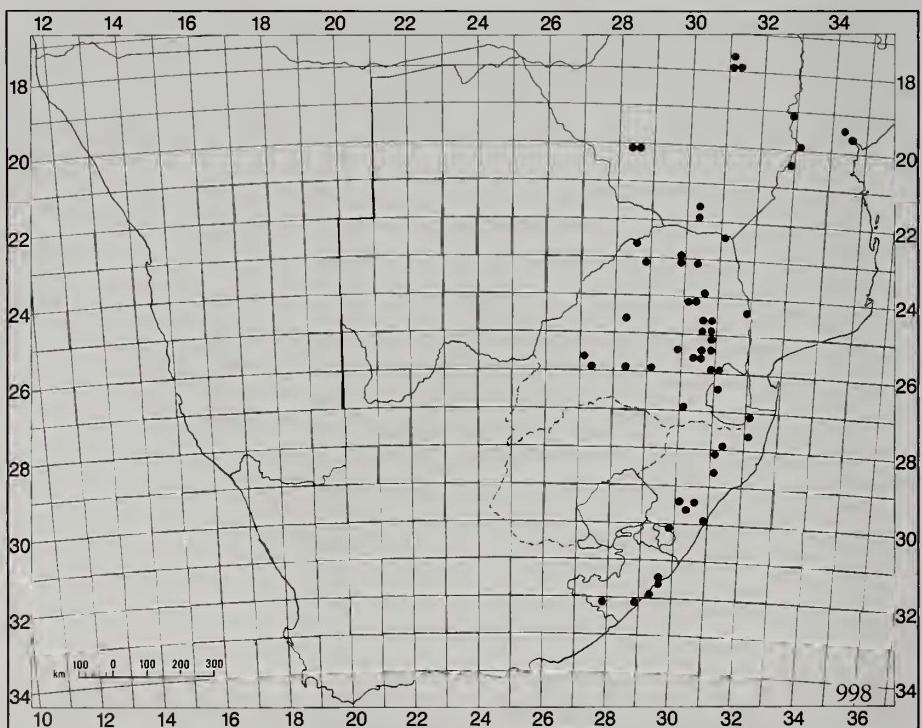


Fig. 998. Southern African distribution of *Chiasmia confuscata* (Warren).

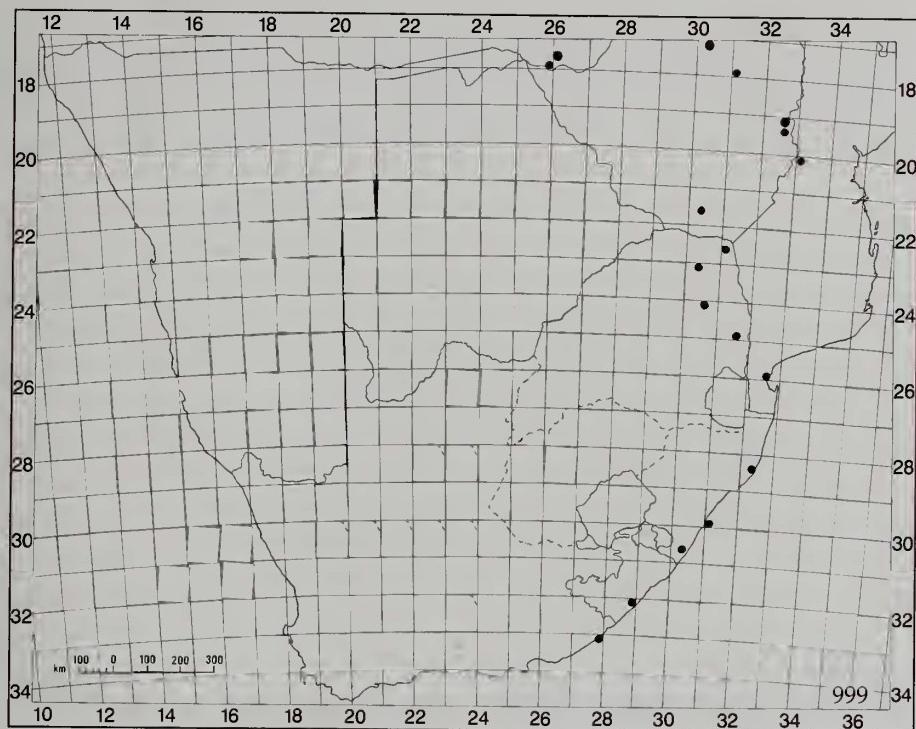


Fig. 999. Southern African distribution of *Chiasmia sororcula* (Warren).

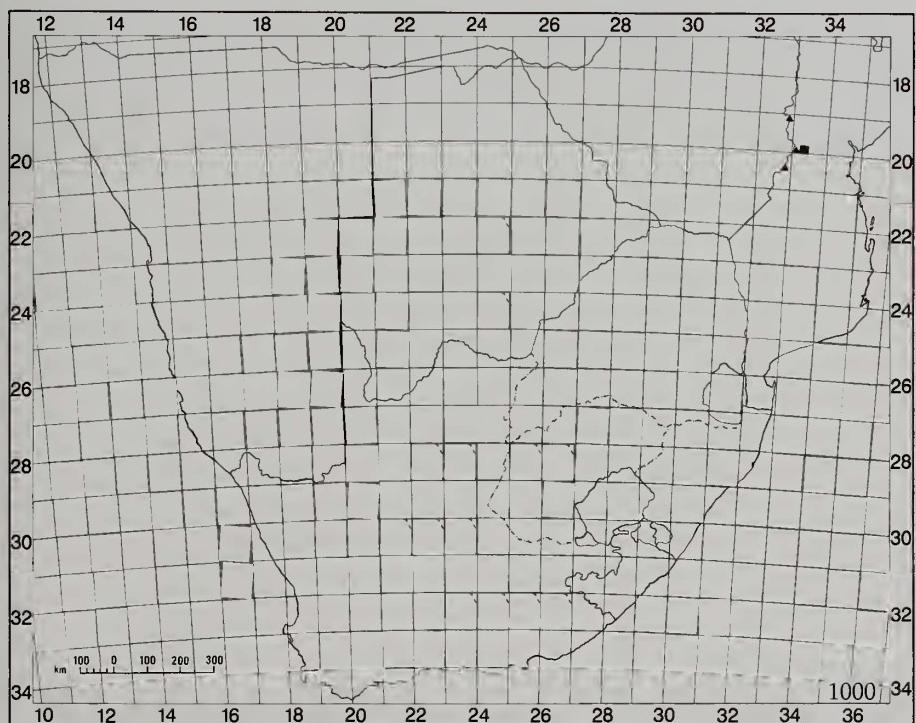


Fig. 1000. Southern African distribution of *Chiasmia fuscatoria* (Möschler) (▲) and *C. threnopsis* (Fletcher) (■).

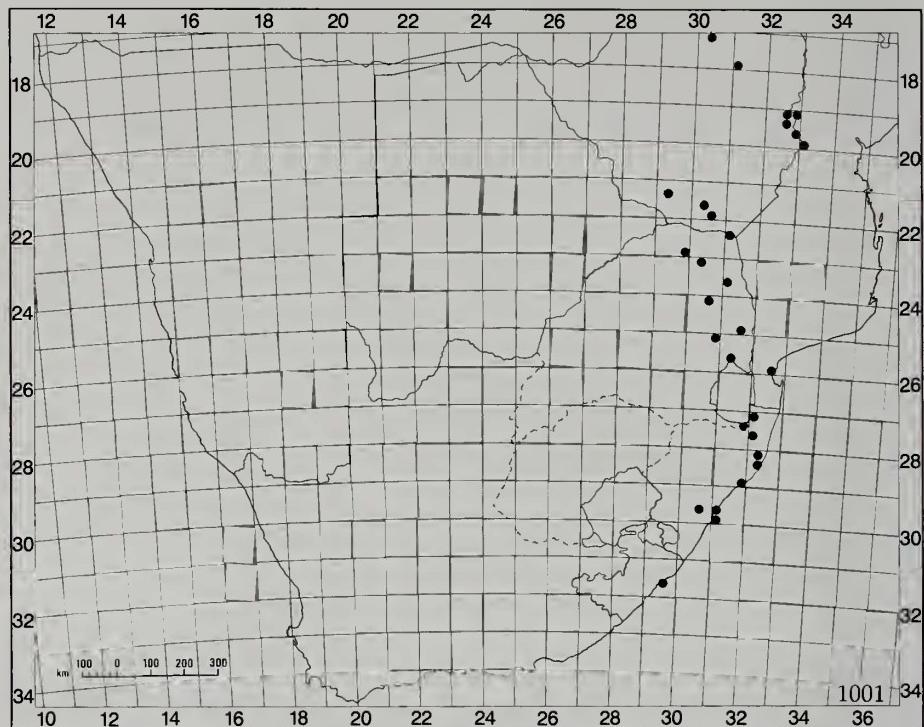


Fig. 1001. Southern African distribution of *Chiasmia s. separata* (Warren).

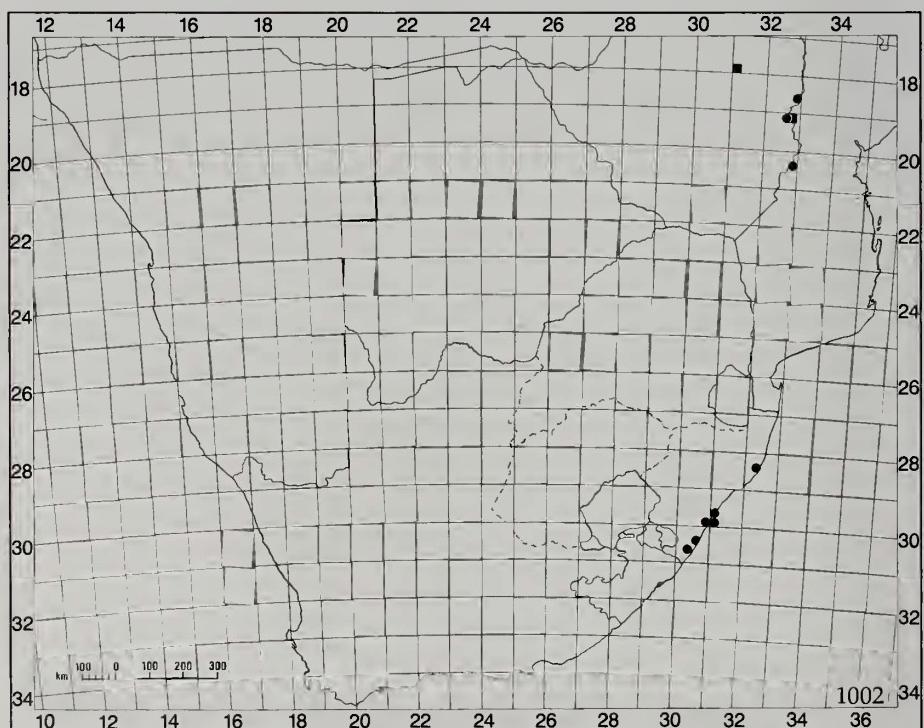


Fig. 1002. Southern African distribution of *Chiasmia natalensis* (Warren) (●) and *C. parallacta* (Warren) (■).

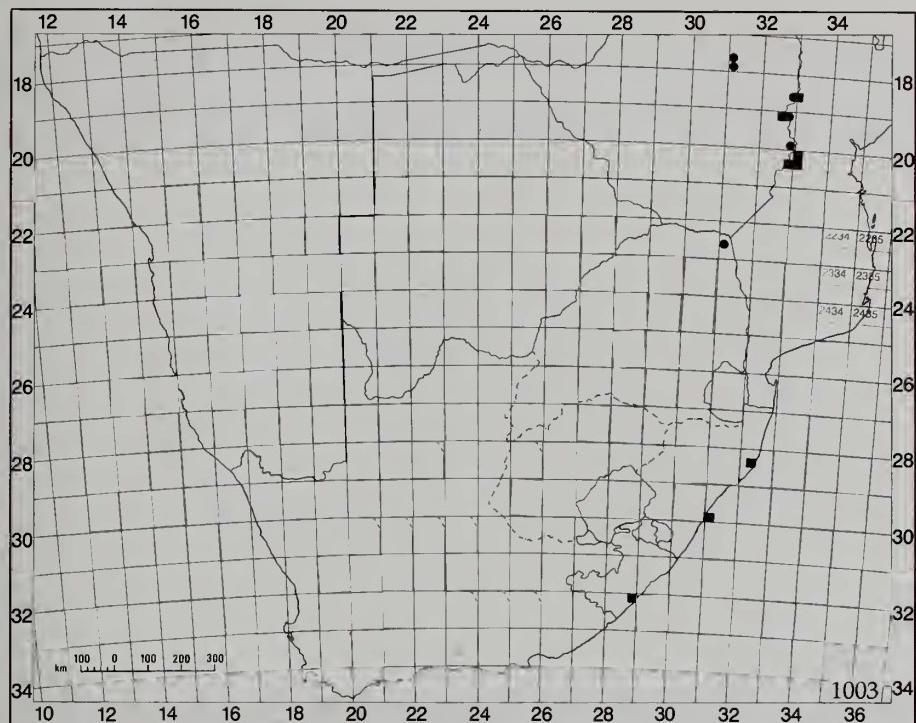


Fig. 1003. Southern African distribution of *Chiasmia paucimacula* sp. n. (●) and *C. inquinata* sp. n. (■).

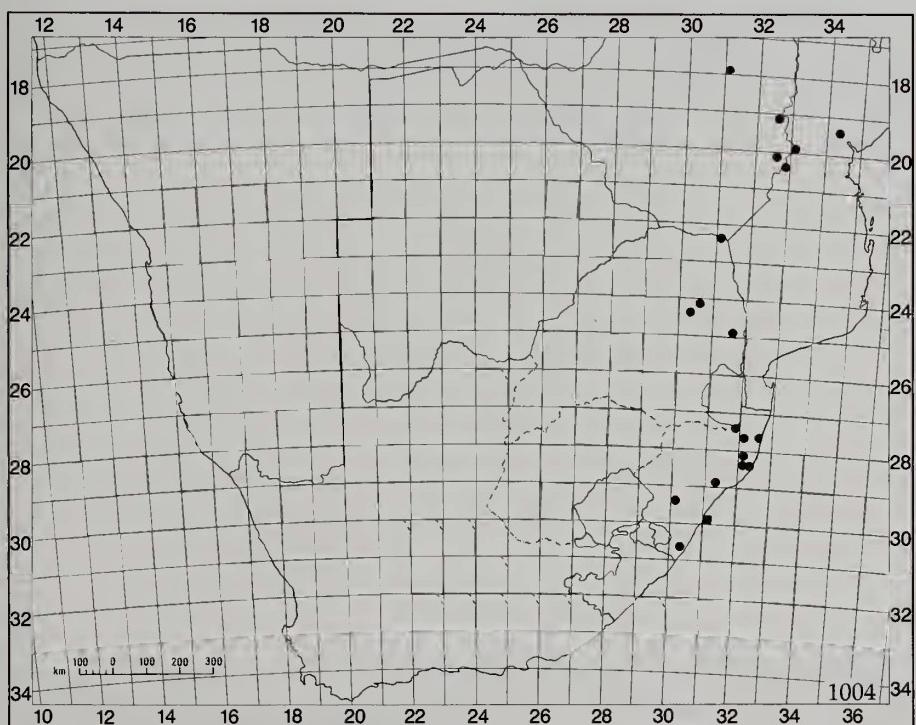


Fig. 1004. Southern African distribution of *Chiasmia feraliata* (Guenée).

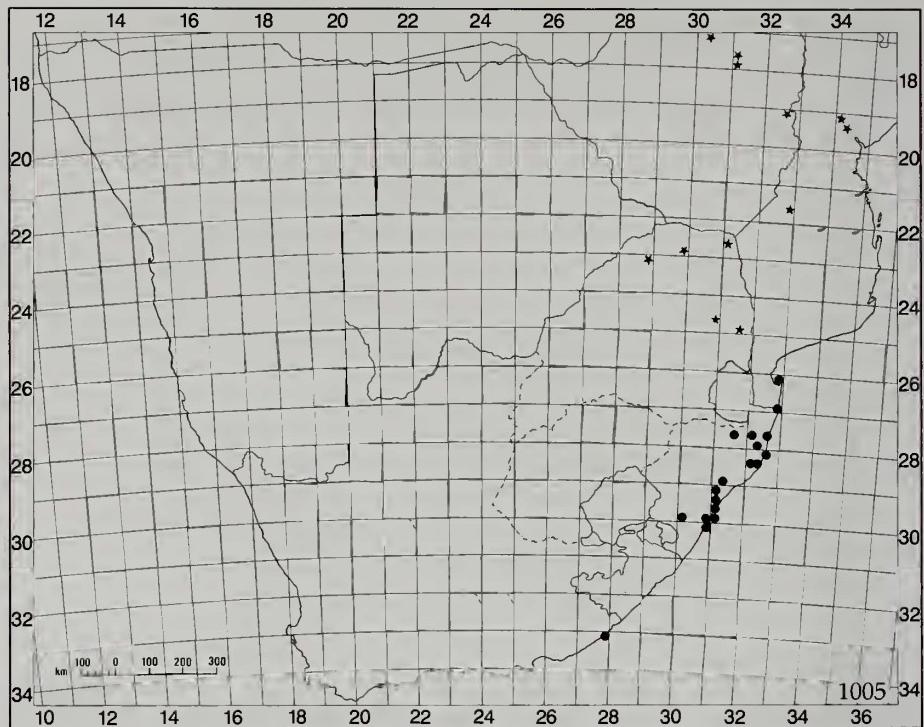


Fig. 1005. Southern African distribution of *Chiasmia a. amarata* (Guenée) (●) and *C. deceptrix* sp. n. (\*).

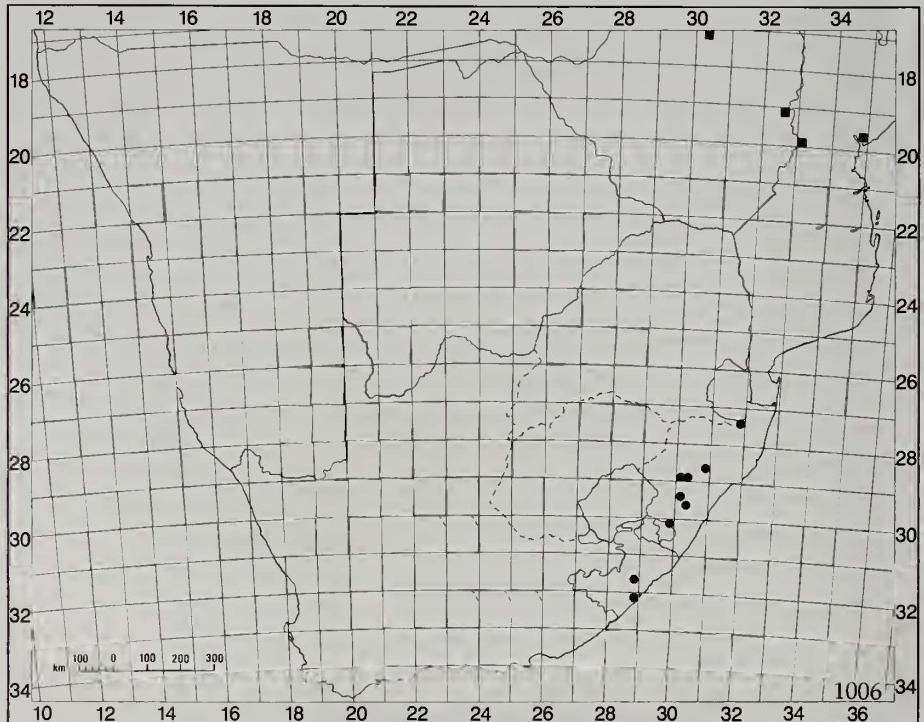


Fig. 1006. Southern African distribution of *Chiasmia duplicitilinea* (Warren) (●) and *C. orientalis* sp. n. (■).

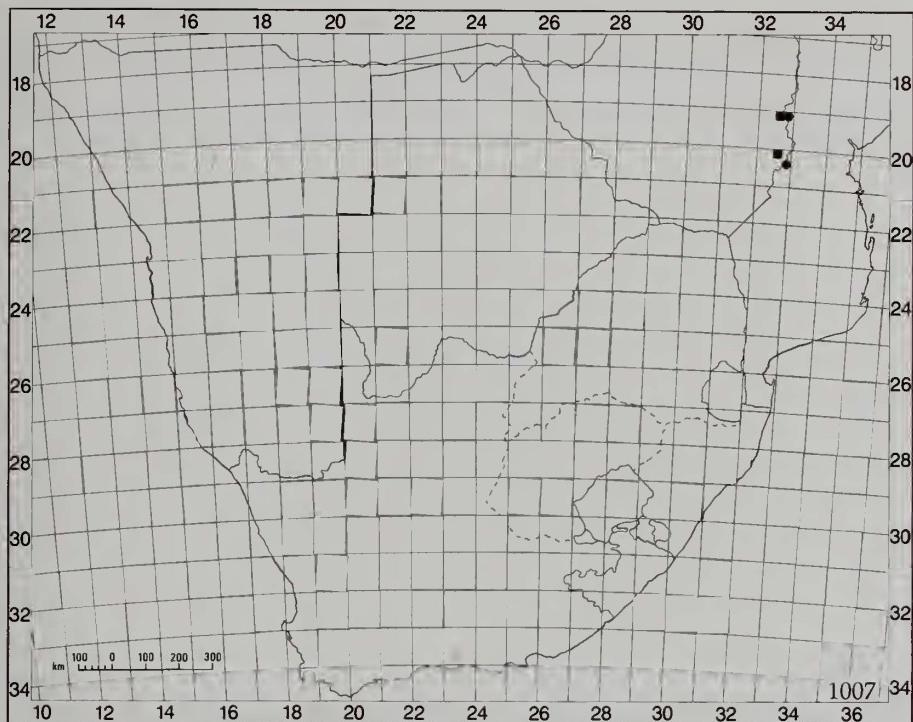


Fig. 1007. Southern African distribution of *Chiasmia subvaria* (Bastelberger) (●) and *C. geminilinea* (Prout) (■).

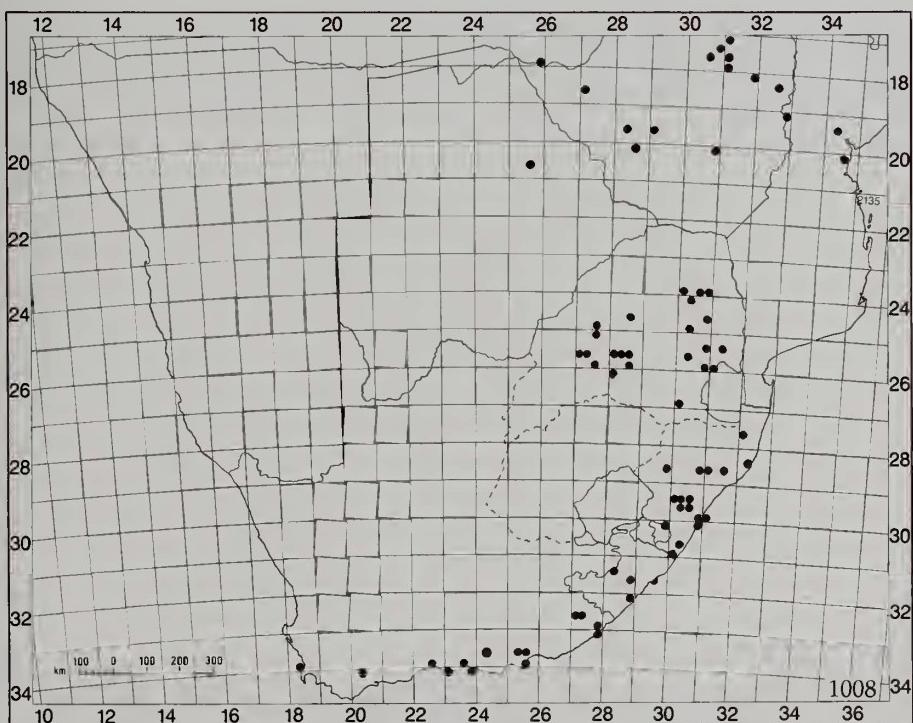


Fig. 1008. Southern African distribution of *Chiasmia s. steniata* (Guenée).

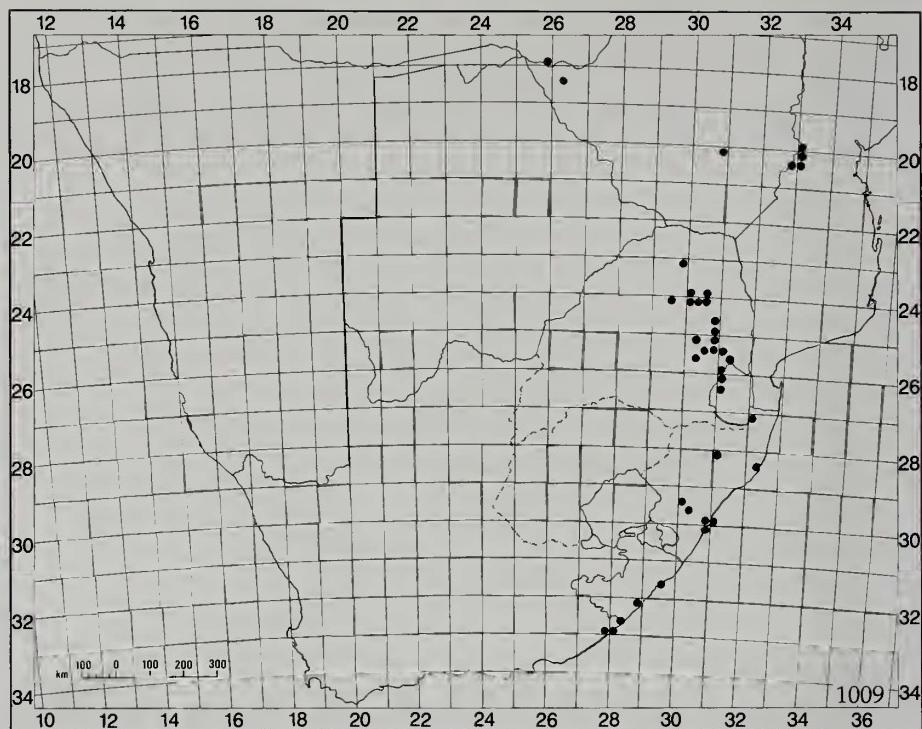


Fig. 1009. Southern African distribution of *Chiasmia u. umbrata* (Warren).

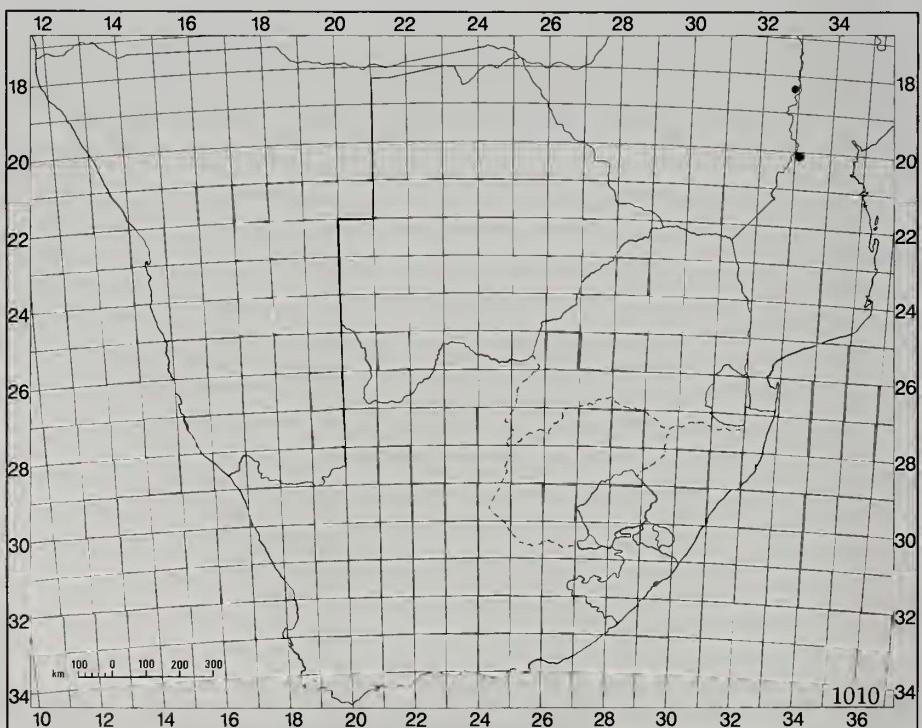


Fig. 1010. Southern African distribution of *Chiasmia maronga* sp. n.

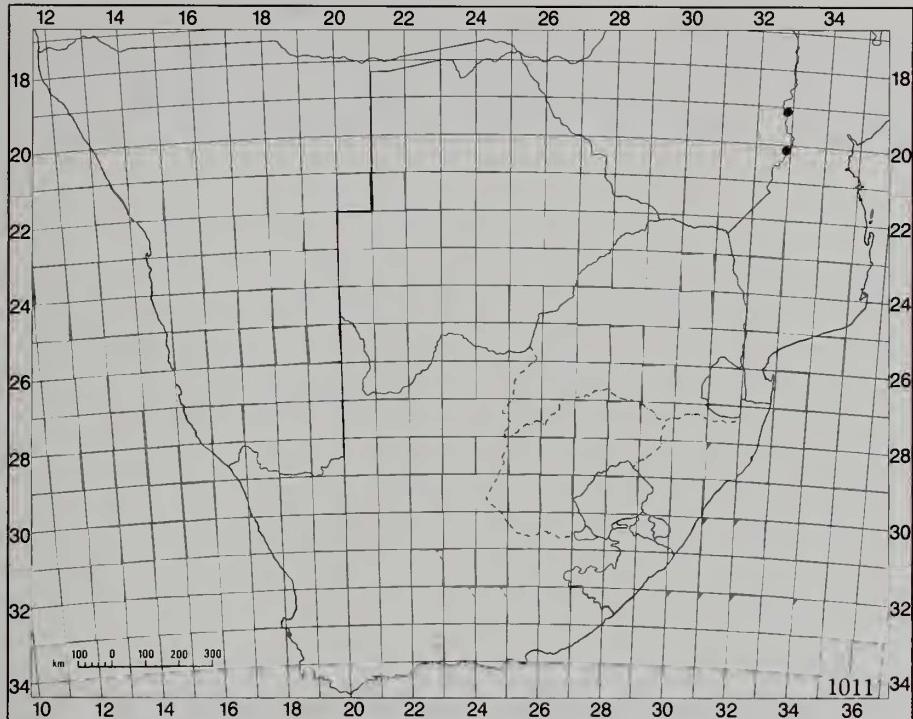


Fig. 1011. Southern African distribution of *Chiasmia contaminata* (Warren).

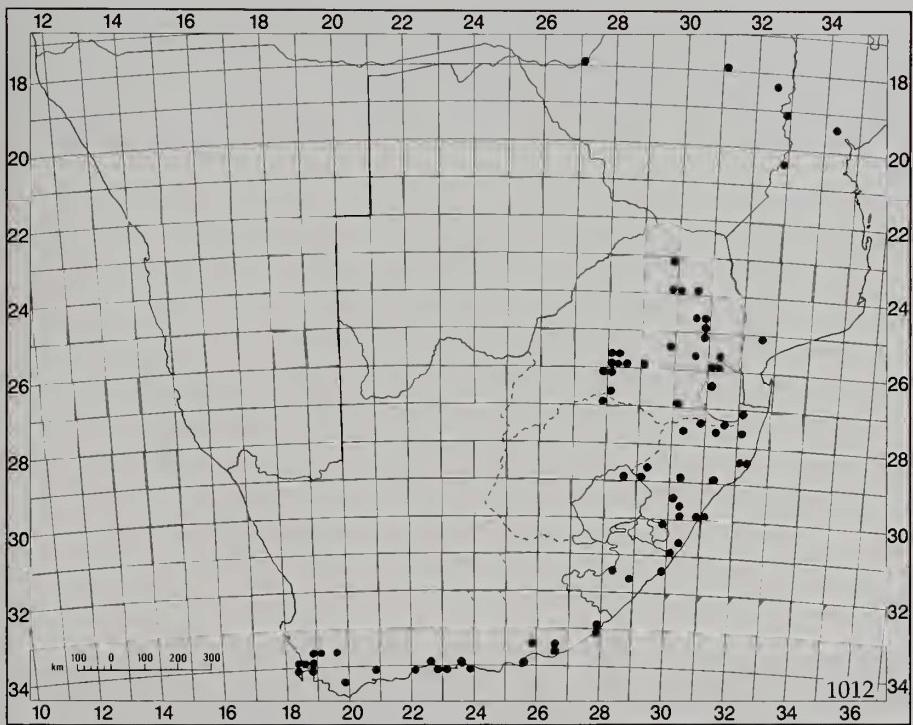


Fig. 1012. Southern African distribution of *Chiasmia s. simplicilinea* (Warren).

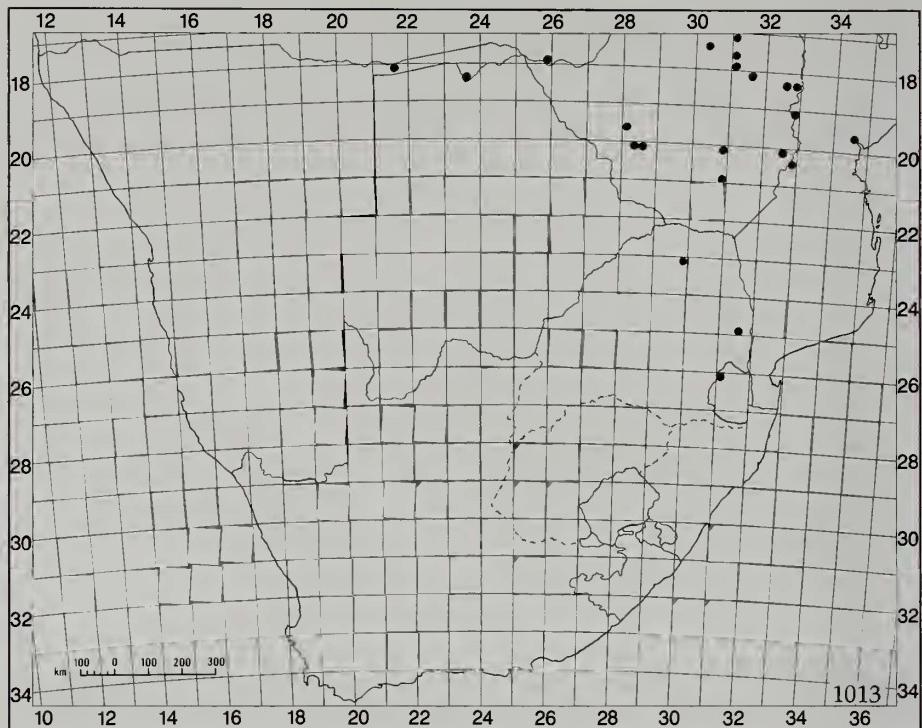


Fig. 1013. Southern African distribution of *Chiasmia kilimanjarensis* (Holland).

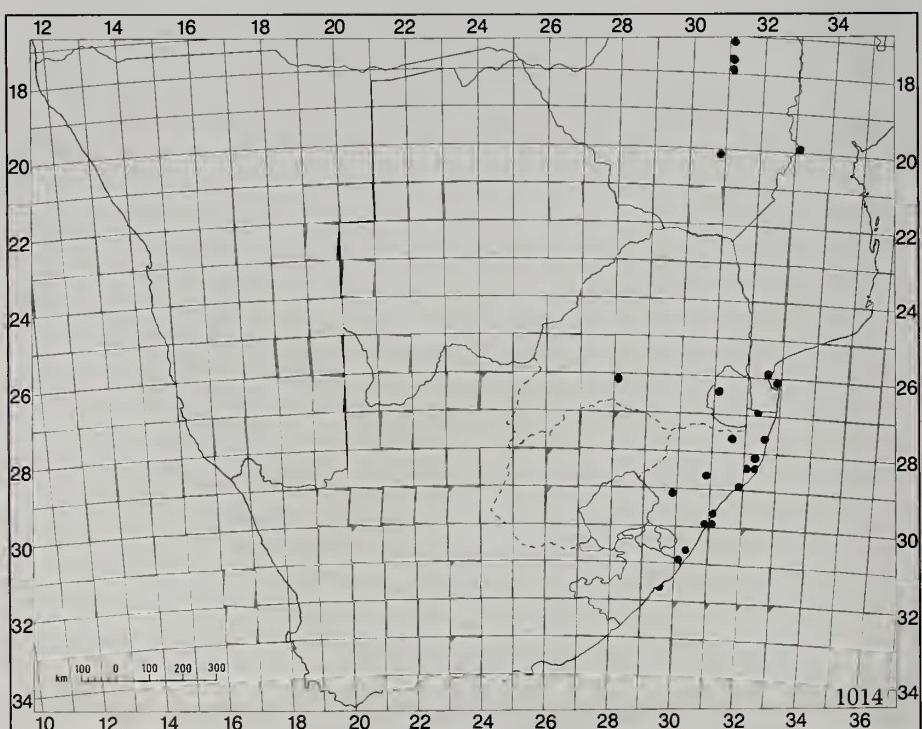


Fig. 1014. Southern African distribution of *Chiasmia rectistriaria* (Herrich-Schäffer).

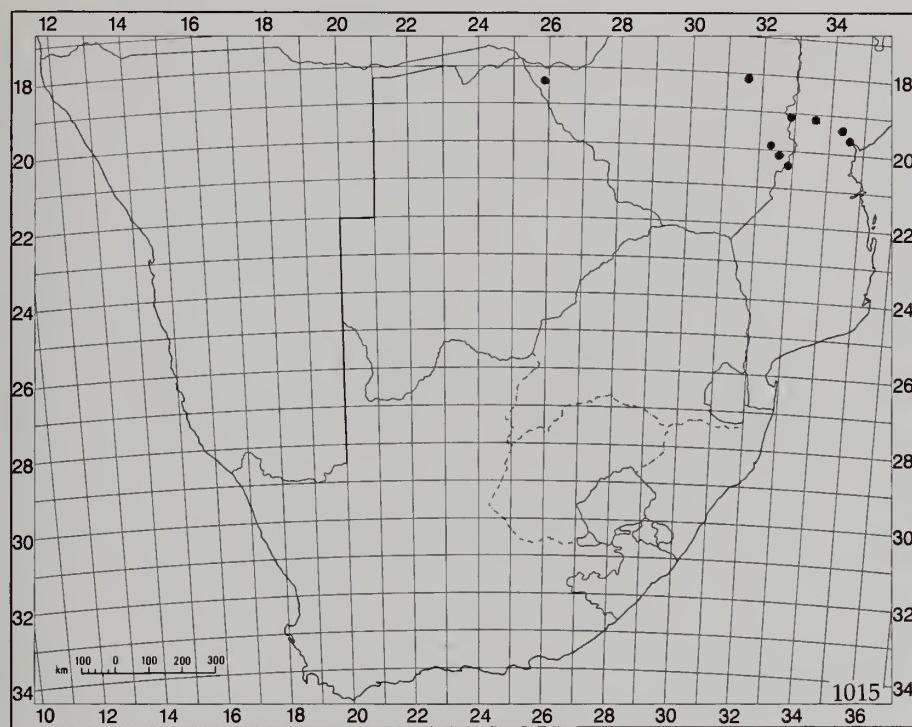


Fig. 1015. Southern African distribution of *Chiasmia m. majestica* (Warren).

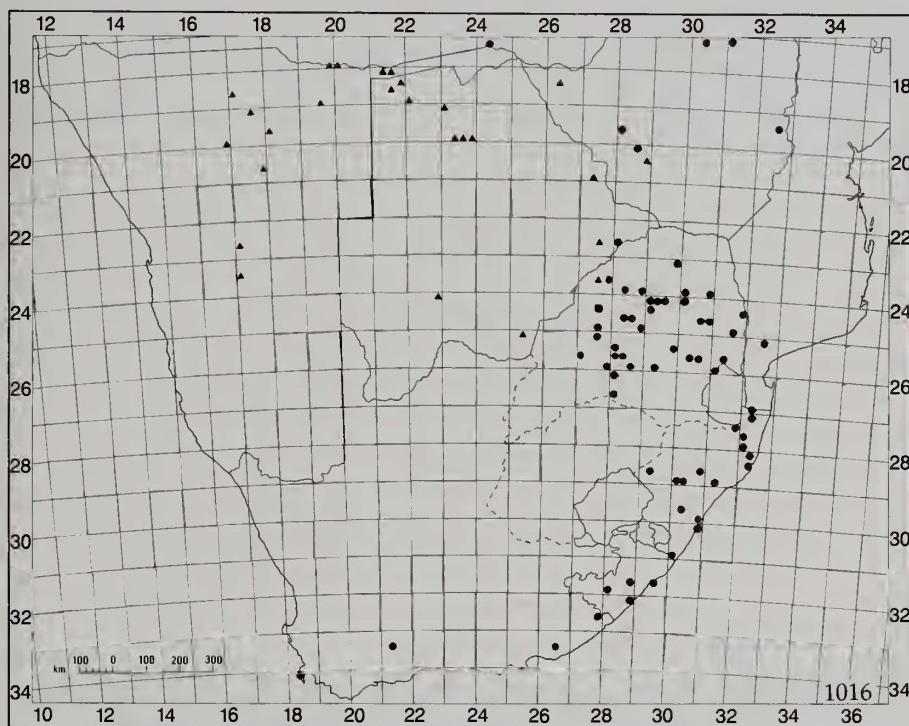


Fig. 1016. Southern African distribution of *Chiasmia m. multistrigata* (Warren) (●) and *C. m. liliput* subsp. n. (▲).

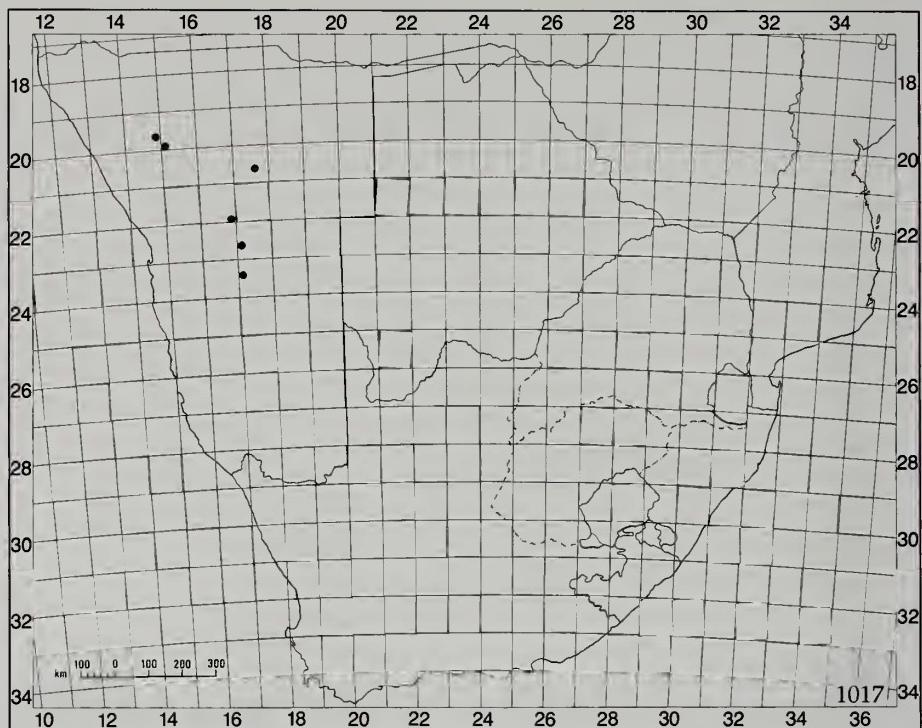


Fig. 1017. Southern African distribution of *Chiasmia zobrysi* (Prout).

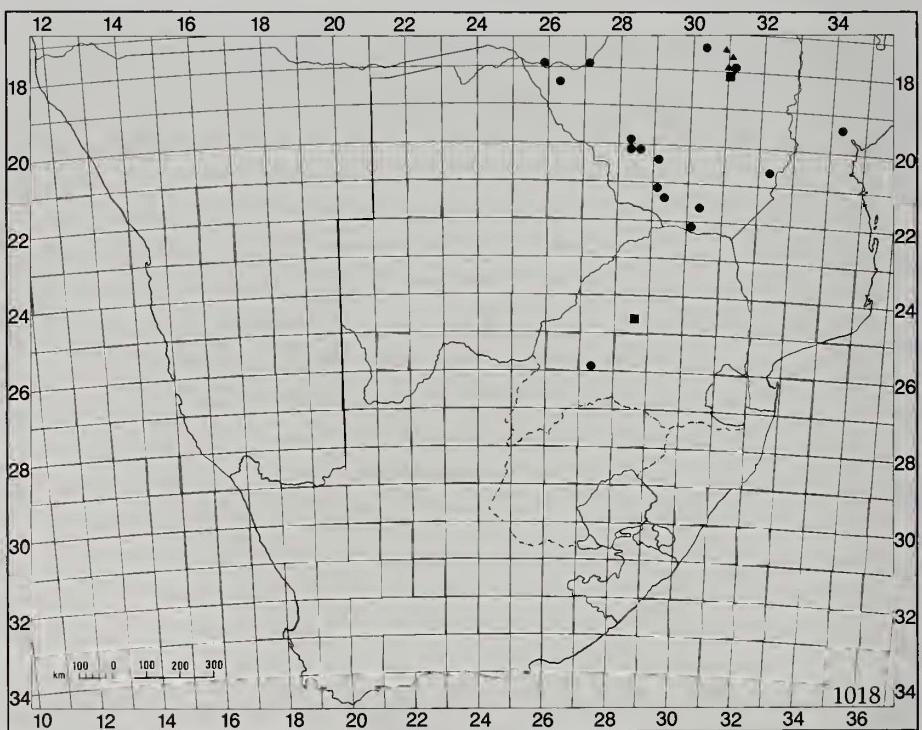


Fig. 1018. Southern African distribution of *Chiasmia boarmioides* sp. n. (●), *C. curvifascia* (Warren) (■) and *C. unifilata* (Warren) (▲).

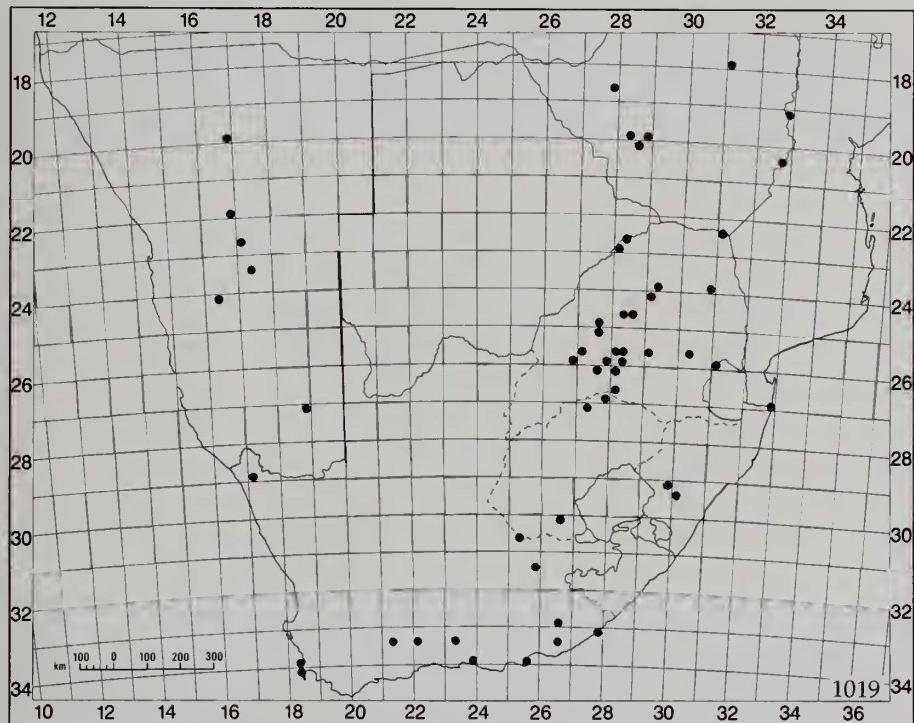


Fig. 1019. Southern African distribution of *Chiasmia turbulentata* (Guenée).

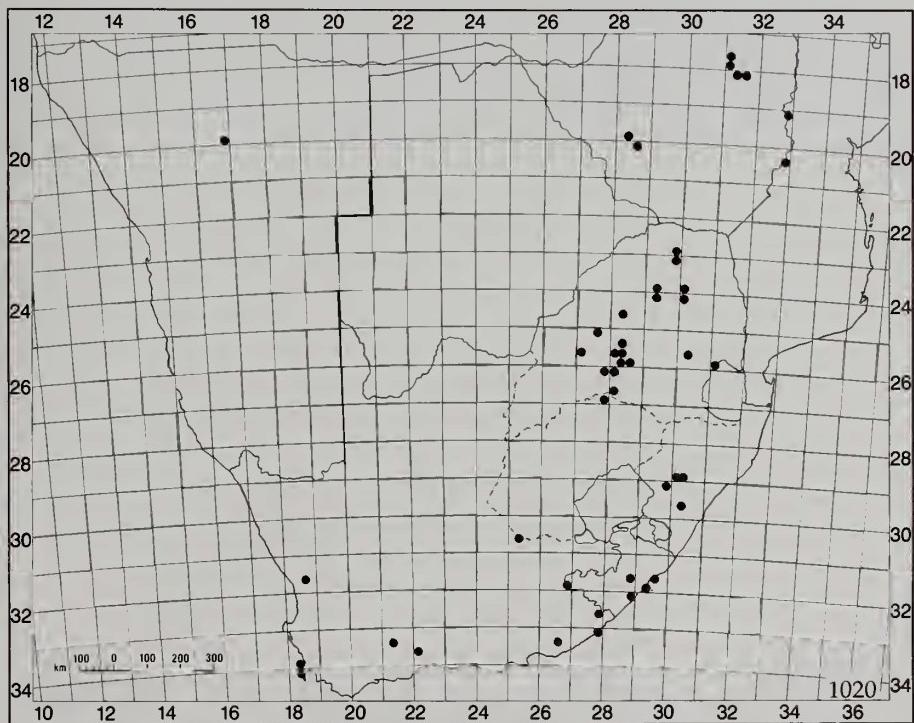


Fig. 1020. Southern African distribution of *Chiasmia procidata semispurcata* (Guenée).

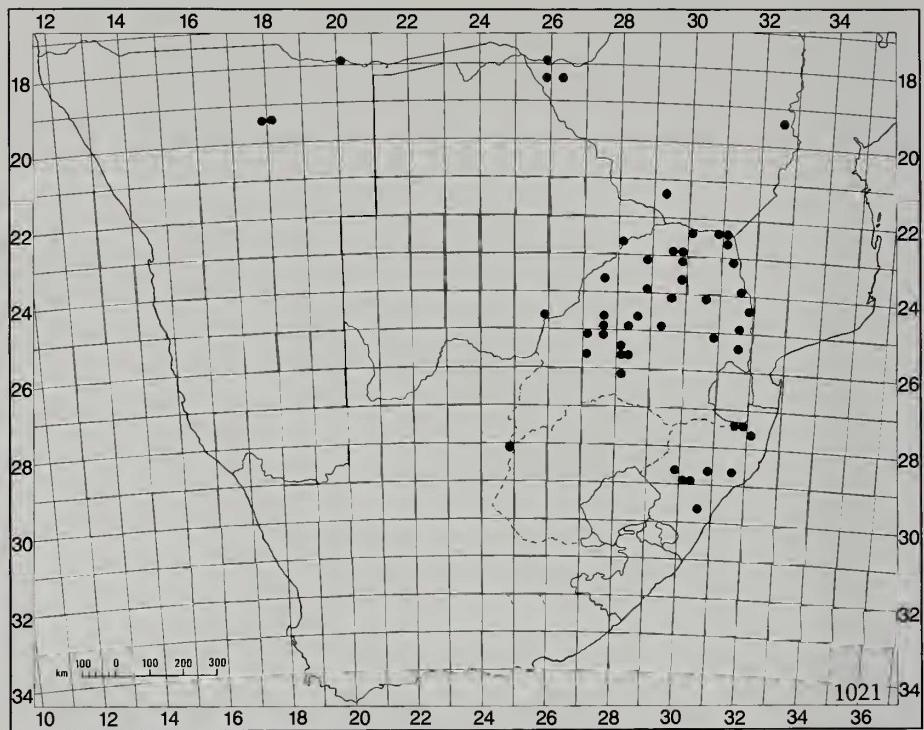


Fig. 1021. Southern African distribution of *Chiasmia furcata* (Warren).

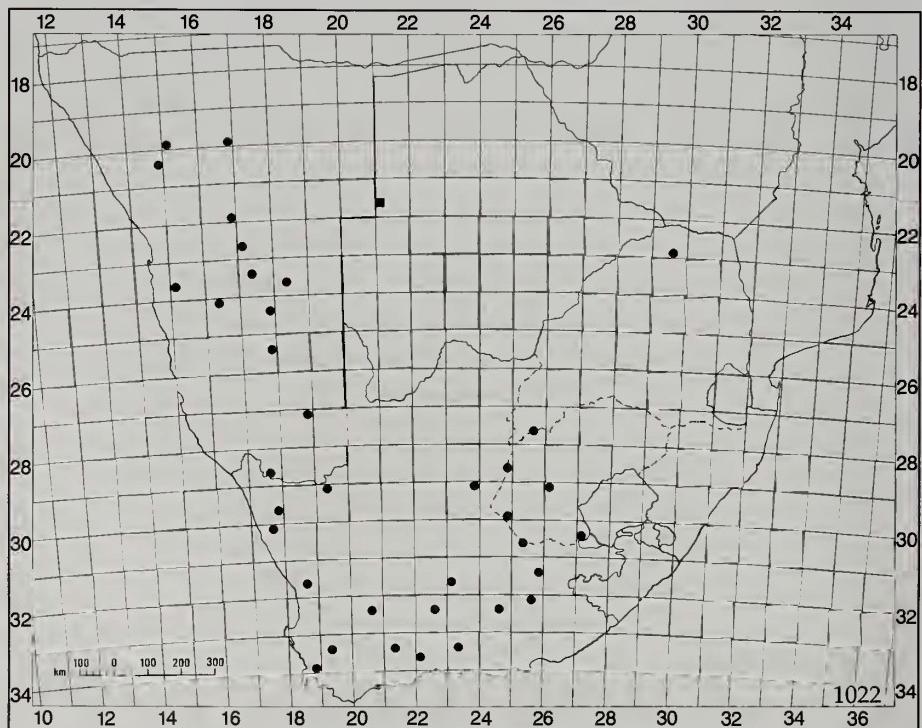


Fig. 1022. Southern African distribution of *Chiasmia i. inaequilinea* (Warren) (●) and *C. i. eremias* (Prout) (■).

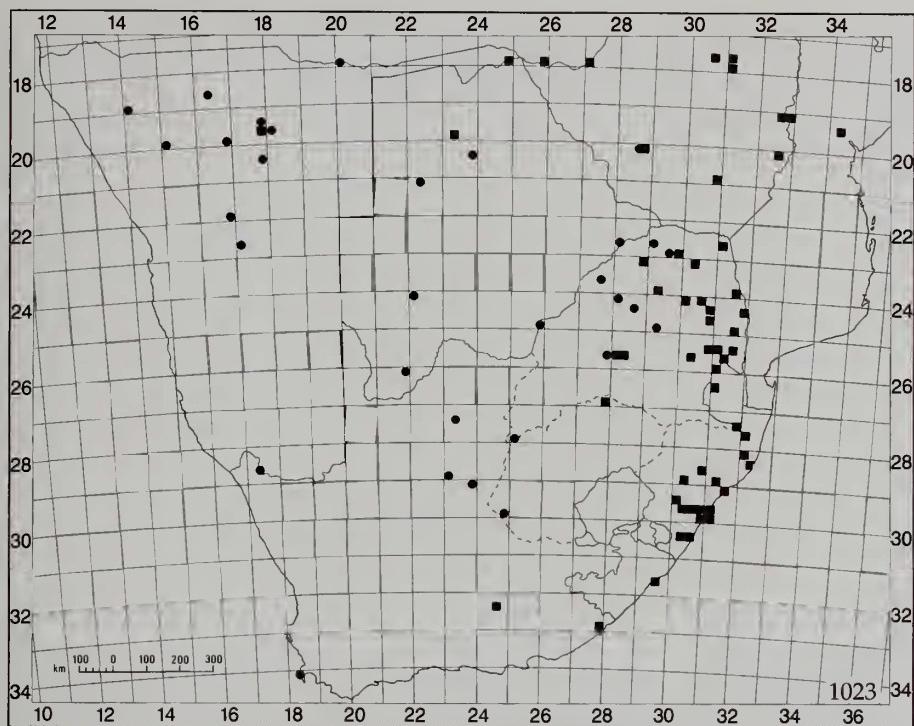


Fig. 1023. Southern African distribution of *Chiasmia grimmia* (Wallengren) (●) and *C. s. subcurvaria* (Mabille) (■).

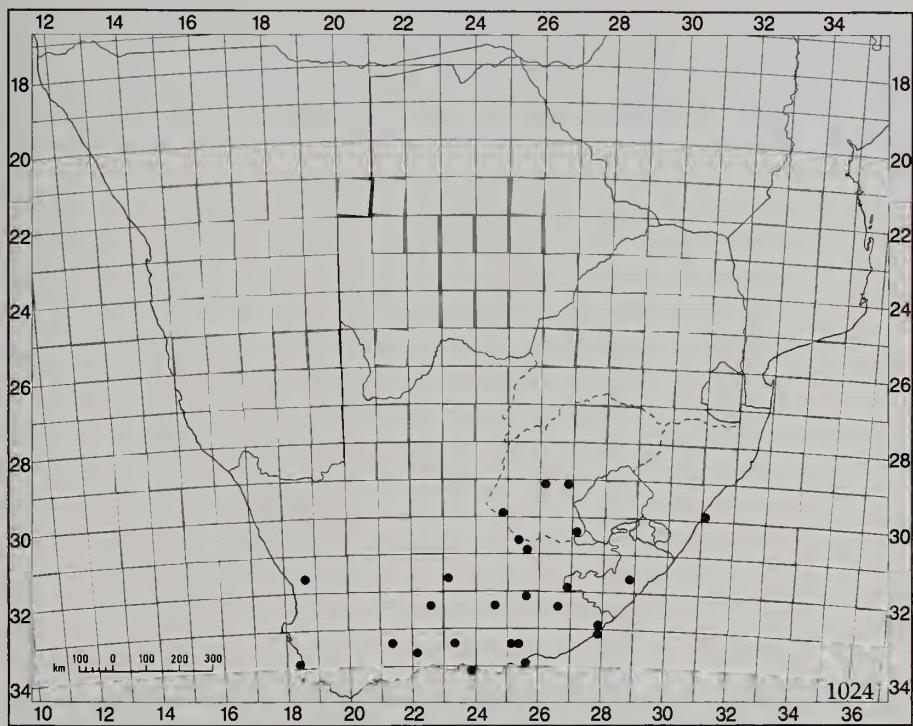


Fig. 1024. Southern African distribution of *Chiasmia observata* (Walker).

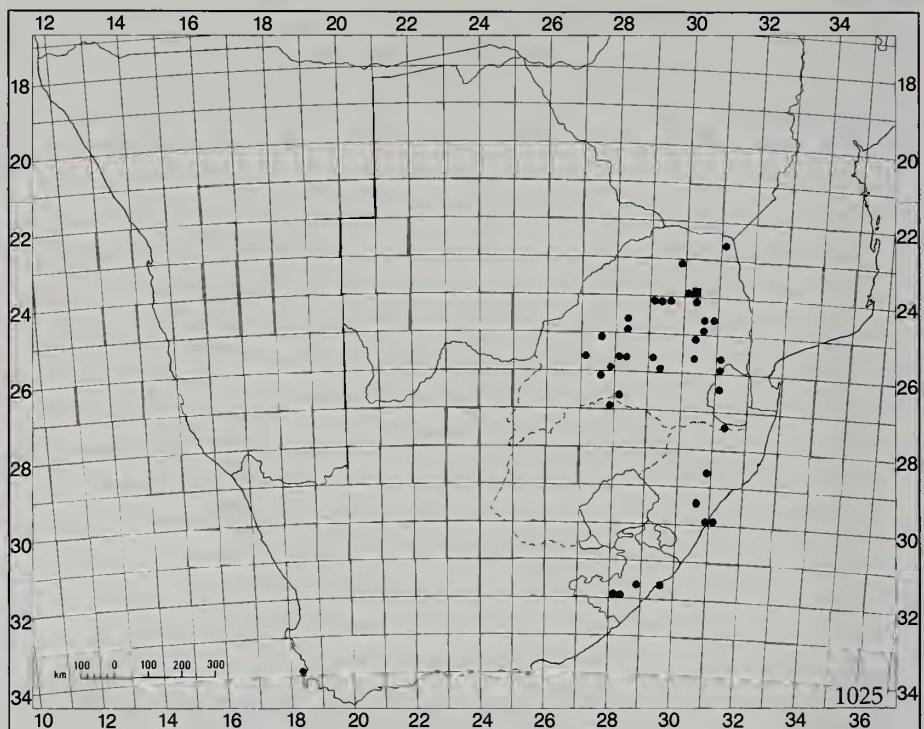


Fig. 1025. Southern African distribution of *Chiasmia kirbyi* (Wallengren) (●) and *C. vau* (Prout) (■).

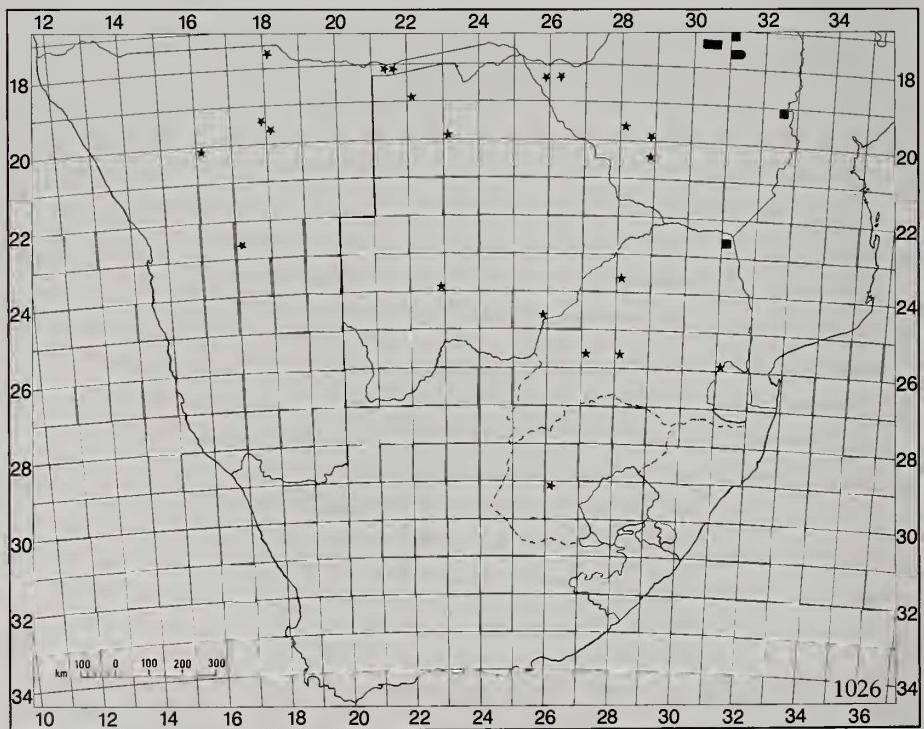


Fig. 1026. Southern African distribution of *Chiasmia semiolivacea* sp. n. (●), *C. punctilinea* (Prout) (\*) and *C. crassata* (Warren) (■).

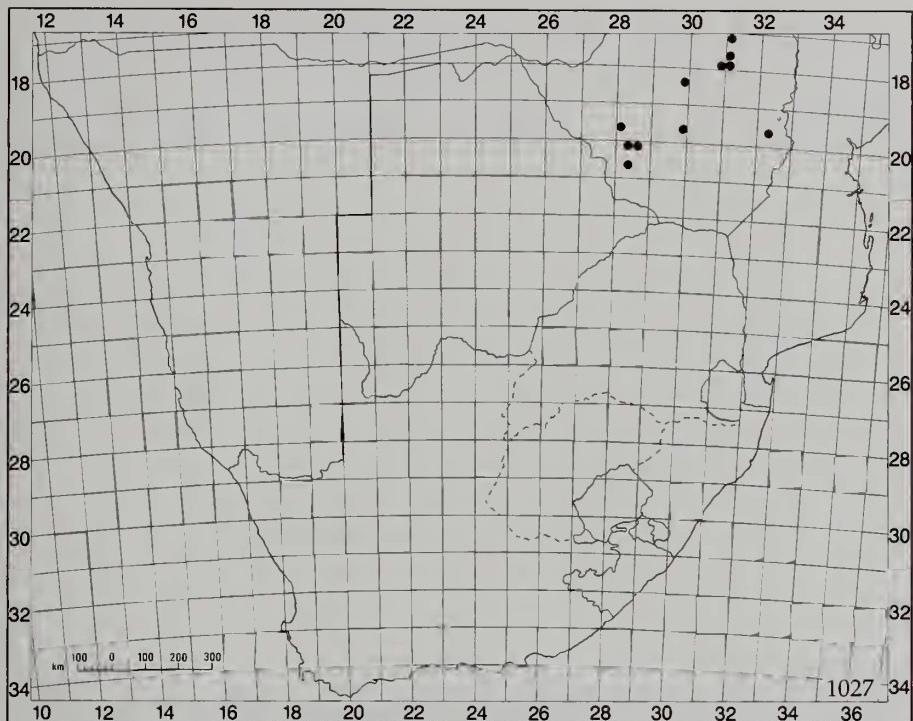


Fig. 1027. Southern African distribution of *Chiasmia costicommata* (Prout).

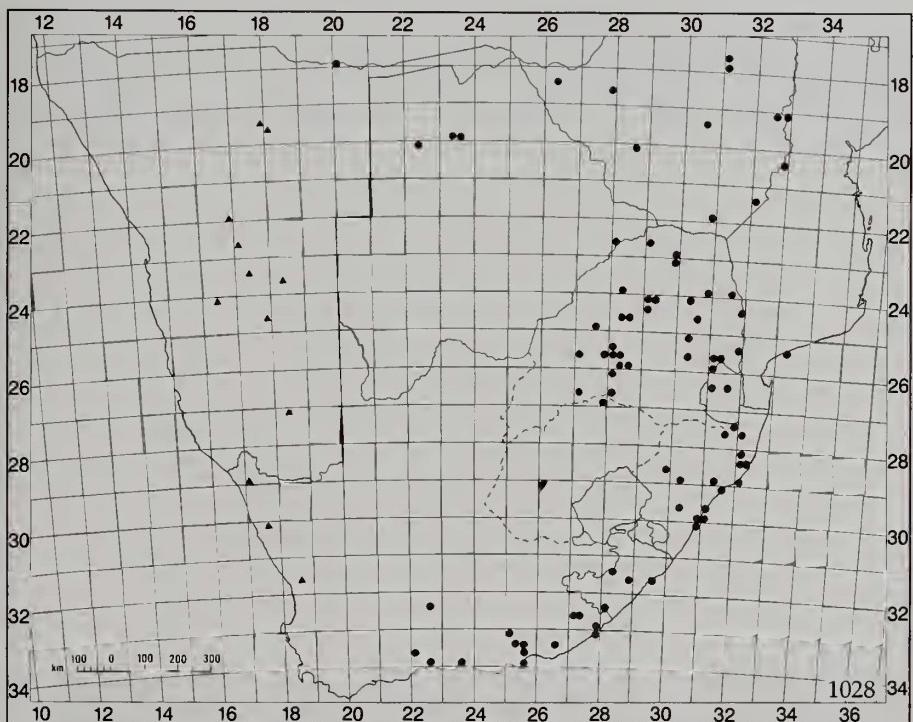


Fig. 1028. Southern African distribution of *Chiasmia b. bringusaria* (Walker) (●) and *C. b. exosciodes* (Prout) (▲).

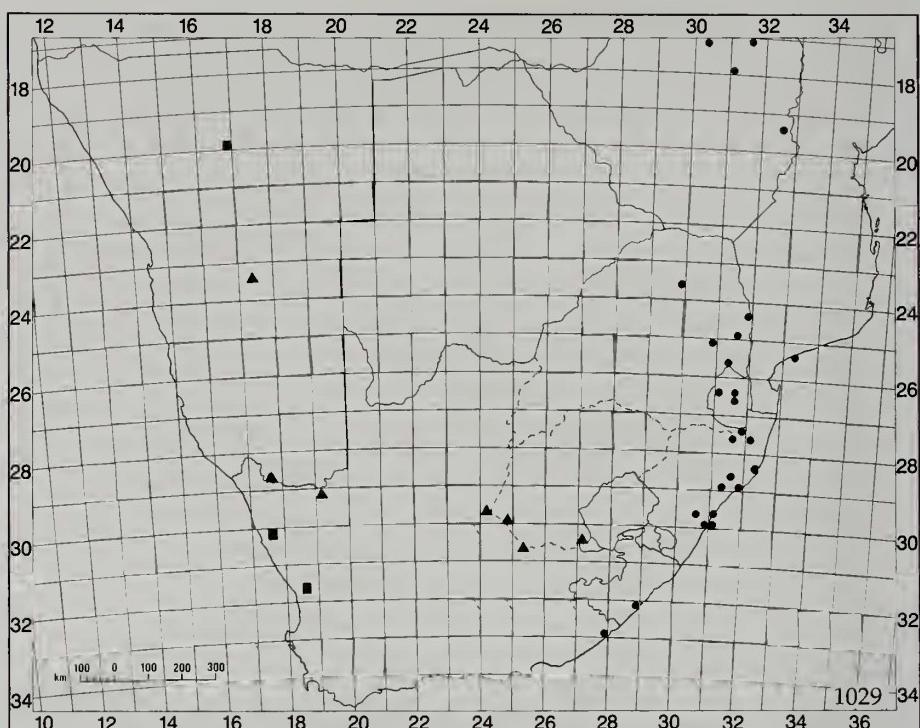


Fig. 1029. Southern African distribution of *Chiasmia tristis* sp. n. (■), *C. assimilis* (Warren) (●) and *C. castanea* sp. n. (▲).

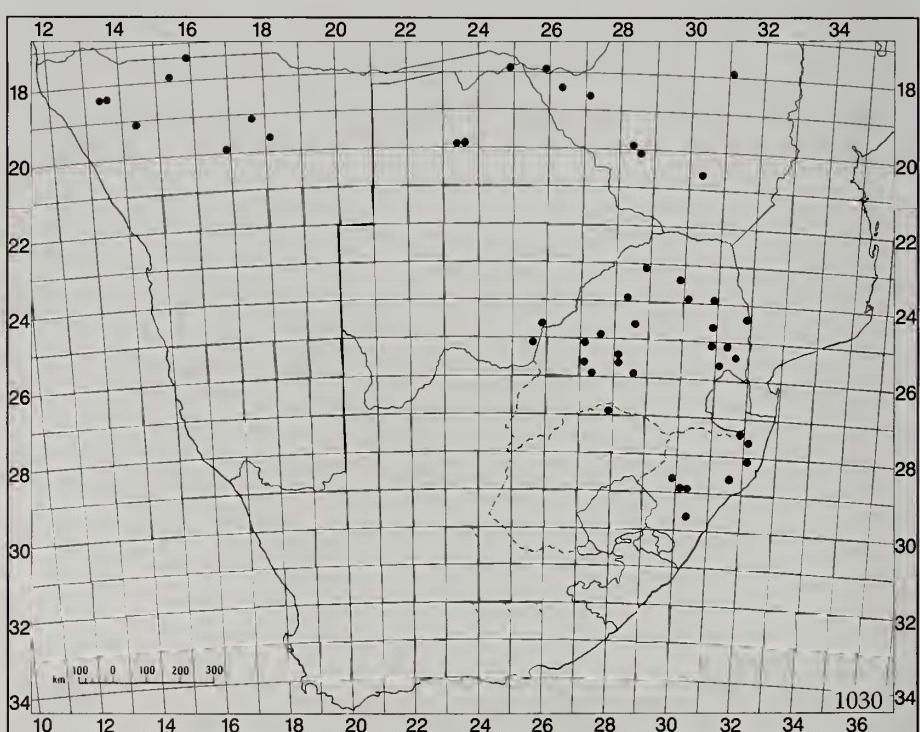


Fig. 1030. Southern African distribution of *Chiasmia i. inconspicua* (Warren).

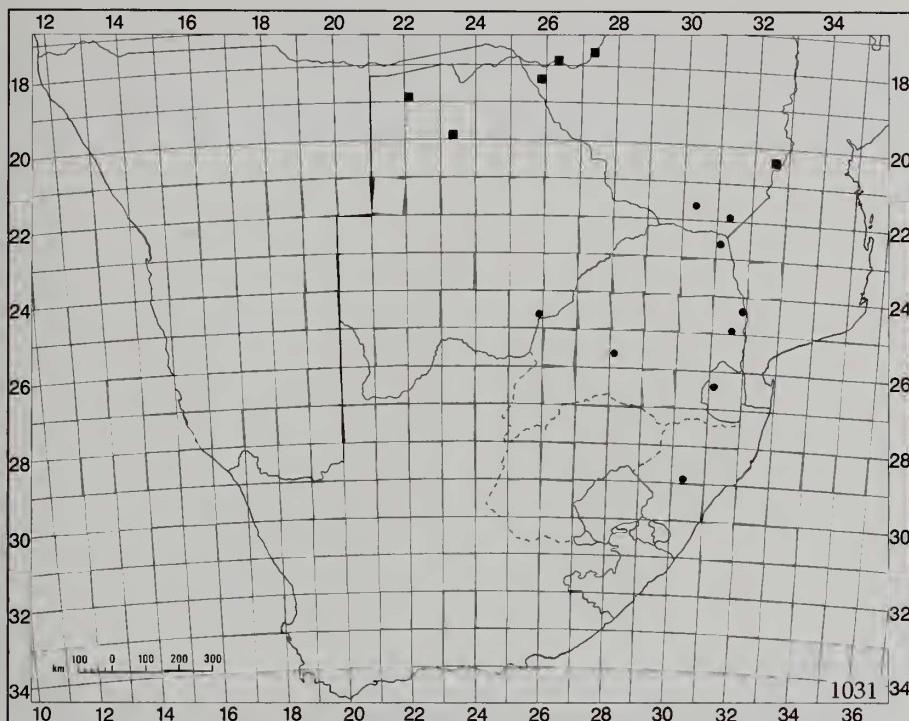


Fig. 1031. Southern African distribution of *Chiasmia ammodes* (Prout) (■) and *C. suriens* (Strand) (●).

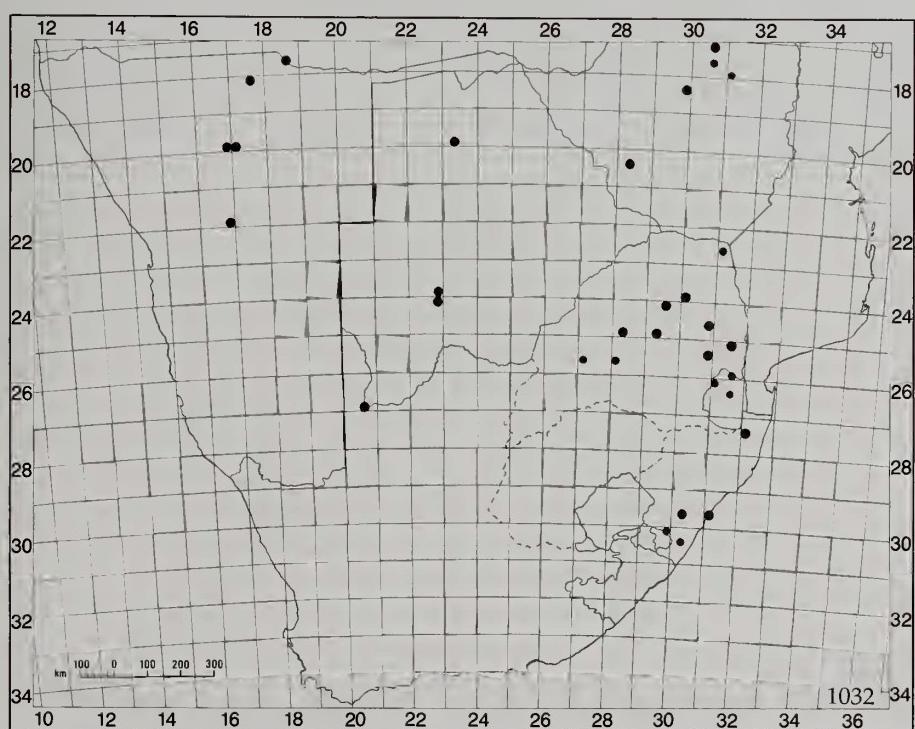


Fig. 1032. Southern African distribution of *Chiasmia trizonaria* (Hampson).

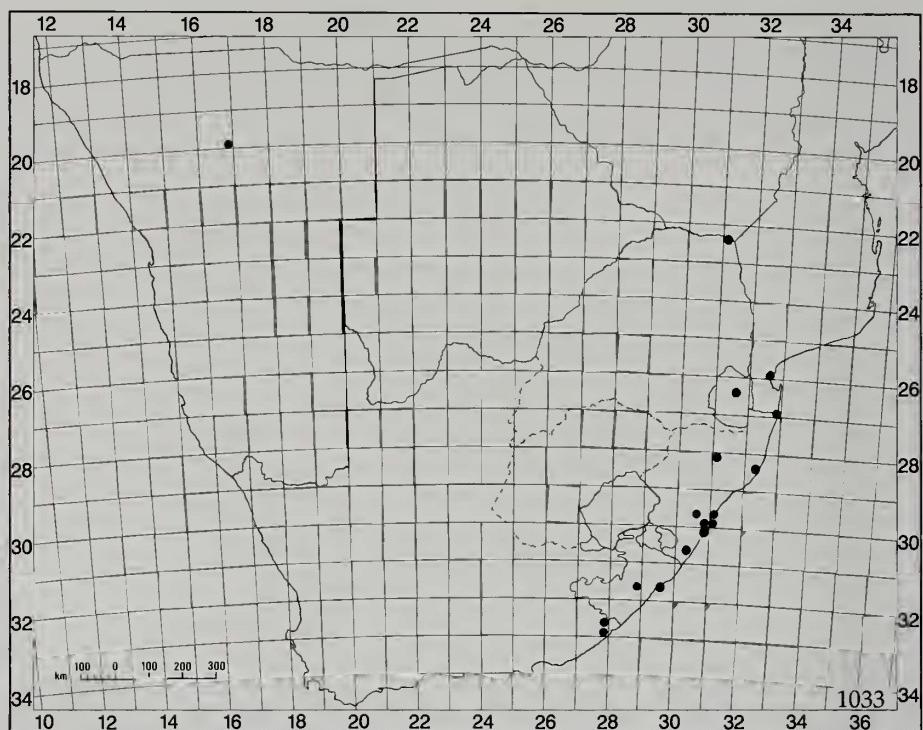


Fig. 1033. Southern African distribution of *Chiasmia umbratilis* (Butler).

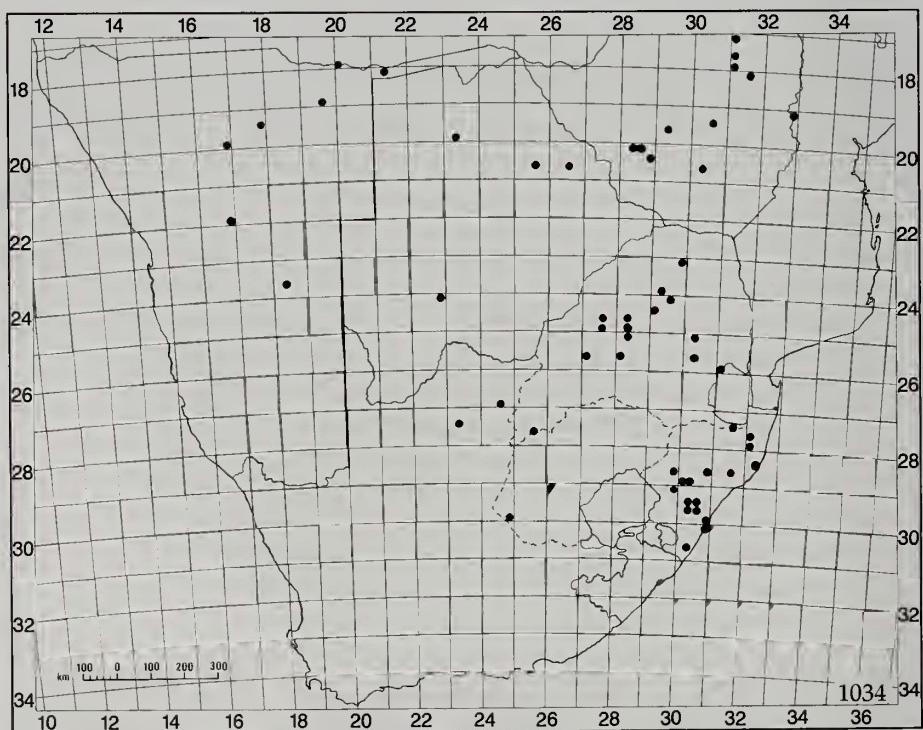


Fig. 1034. Southern African distribution of *Chiasmia marmorata* (Warren).

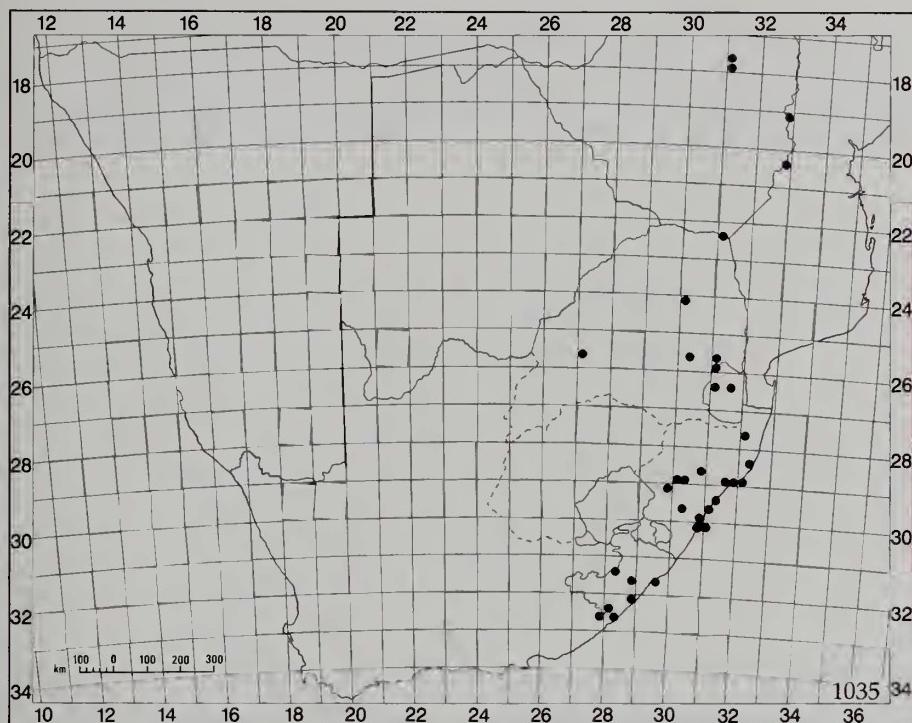


Fig. 1035. Southern African distribution of *Chiasmia interrupta* (Warren).

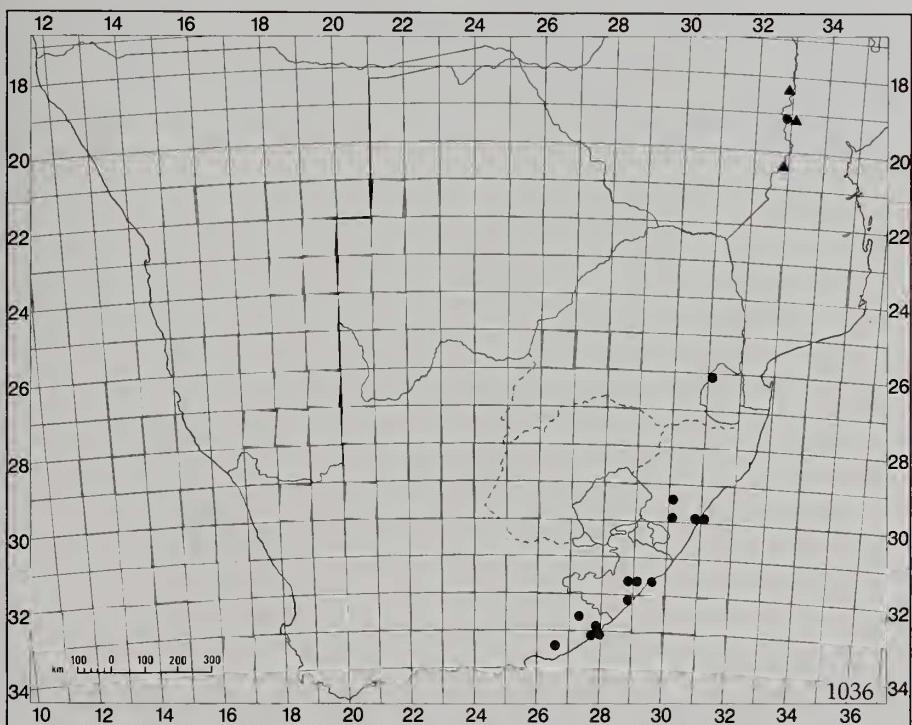


Fig. 1036. Southern African distribution of *Chiasmia abnormata* (Prout) (●) and *C. getula* (Wallengren) (▲).

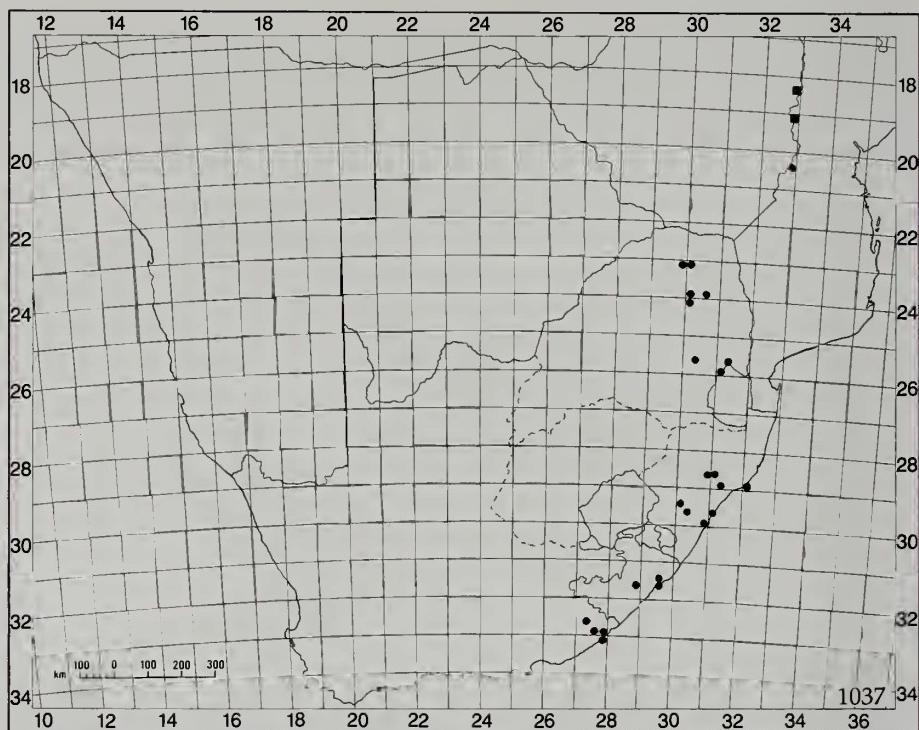


Fig. 1037. Southern African distribution of *Chiasmia arenosa* (Butler) (●) and *C. nana* (Warren) (■).

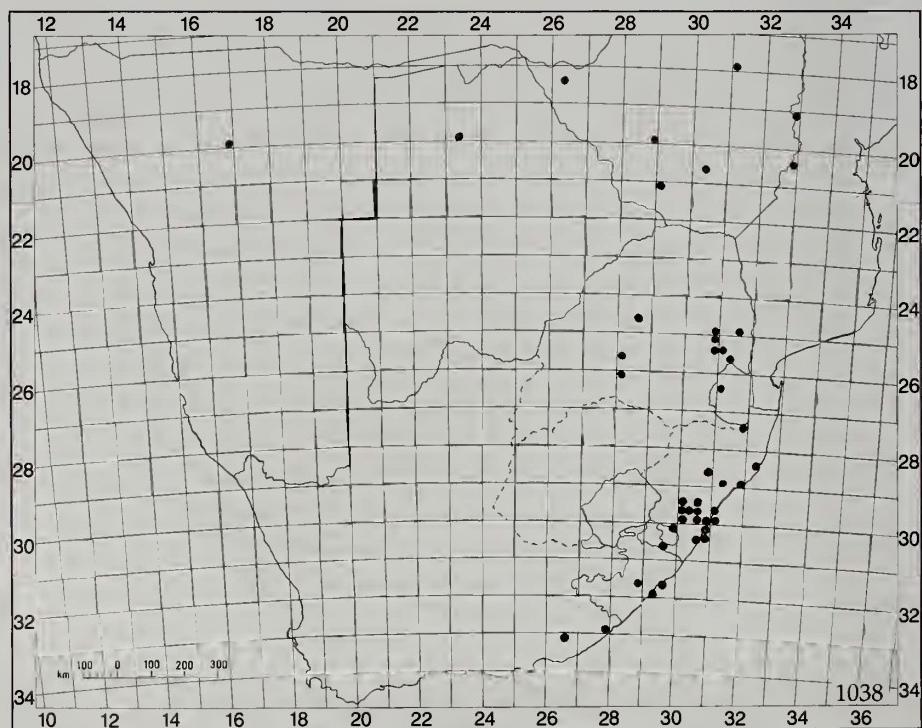


Fig. 1038. Southern African distribution of *Chiasmia normata* (Walker).

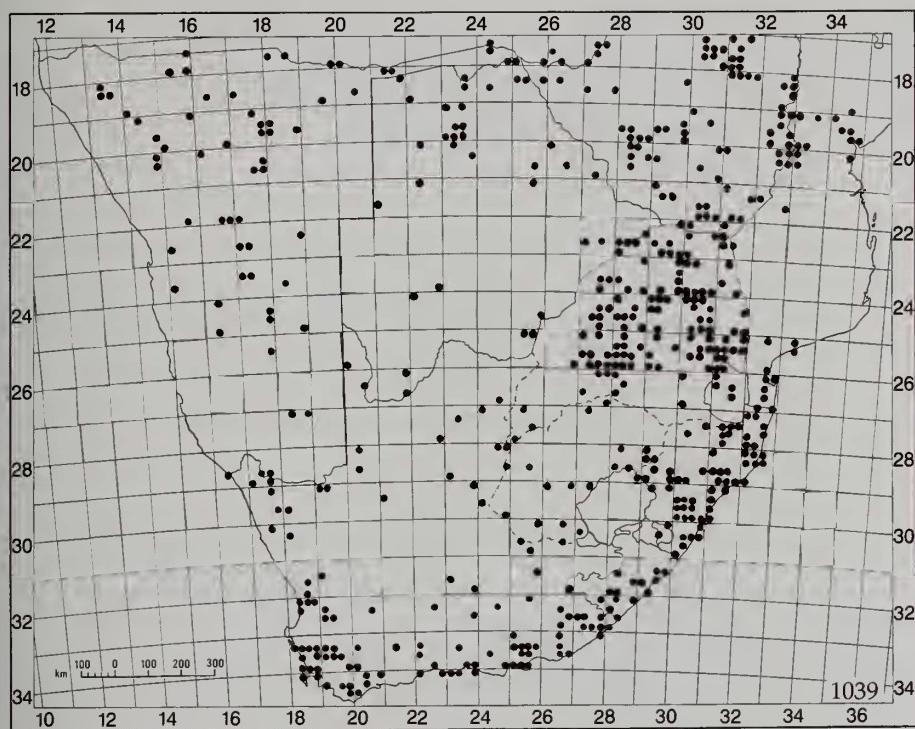


Fig. 1039. Recorded southern African distribution of Macariini.

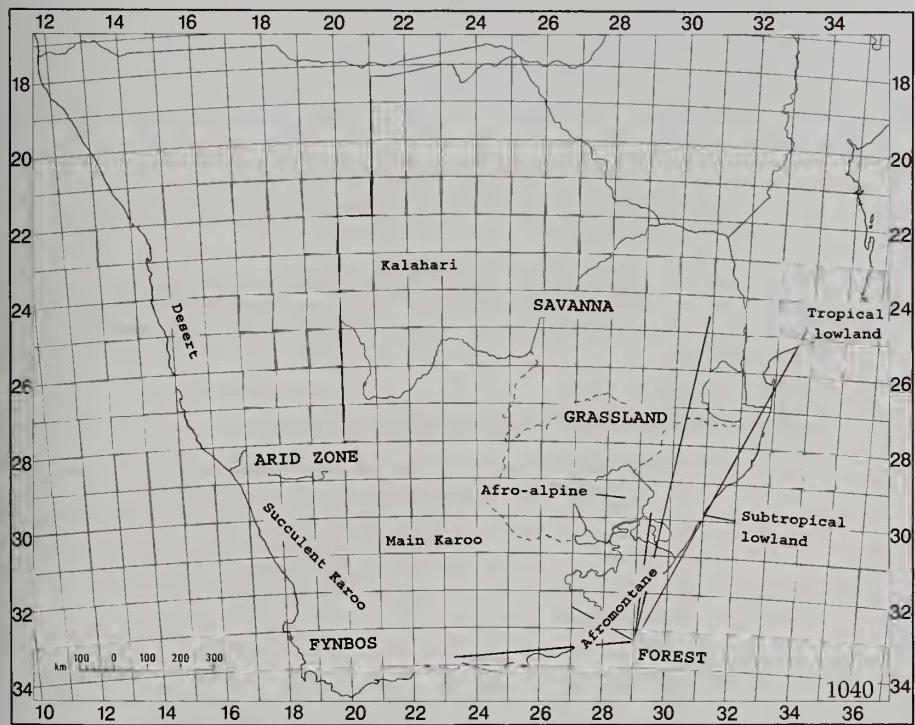


Fig. 1040. Boundaries of the major biomes in southern Africa (after Rutherford & Westfall (1986); frequency percentages omitted).

**Table 1.** Food plant records for Afro-tropical Macariini.

<i>Platypepla loranthiphaga:</i>	<i>Loranthus</i> sp.
<i>P. griseobrunnea:</i>	<i>Loranthus elegans</i> Cham. & Schlechtendal (= <i>Moquinella rubra</i> (Spreng. f.) Balle)
<i>P. spurcata:</i>	<i>Loranthus quinquenervis</i> Hochst. (= <i>Tieghemia quinquenervia</i> (Hochst.) Balle)
<i>Plateopia acrobelia:</i>	<i>Ximenia americana</i> L.; in captivity <i>X. caffra</i> Sond.
<i>Isturgia berytaria:</i>	<i>Calicotome villosa</i> (Poiret) Link
<i>I. exustaria:</i>	<i>Retama</i> (= <i>Genista</i> ) <i>raetam</i> Webb ex Berth.
<i>I. miniosaria:</i>	<i>Calicotome spinosa</i> L. (Link); <i>Genista purgans</i> L., <i>G. scorpius</i> (L.) DC.; <i>Ulex</i> spp.
<i>I. spodiaria mizanensis:</i>	<i>Calicotome spinosa</i> L. (Link)
<i>I. catalaunaria:</i>	<i>Dorycnium</i> sp.; <i>Rhynchosia totta</i> (Thunb.) DC.; <i>Tephrosia bracteolata</i> Guill. & Perr.; <i>Indigofera</i> sp.
<i>I. supergressa:</i>	<i>Mundulea sericea</i> (Willd.) Chev.
<i>I. deerraria:</i>	<i>Acacia decurrens</i> Willd., <i>A. eburnea</i> Willd., <i>A. gummifera</i> Willd., <i>A. karroo</i> Hayne (= <i>A. hirtella</i> E. Meyer), <i>A. mollissima</i> Willd. (= <i>A. mearnsii</i> De Wild.), <i>A. nilotica</i> (L.) Willd. ex Del., <i>A. raddiana</i> Savi, <i>A. seyal</i> Del.; <i>Peltophorum africanum</i> Sond.; wattle
<i>I. disputaria:</i>	<i>Acacia mollissima</i> Willd. (= <i>A. mearnsii</i> De Wild.), <i>A. nilotica</i> (L.) Willd. ex Del.; <i>A. decurrens</i> Willd.
<i>I. exerraria:</i>	<i>Pterocelastrus tricuspidatus</i> (Lam.) Sond.; <i>Aspalathus linearis</i> (Burm. f.) Dahlg.
<i>I. megasaccus:</i>	<i>Acacia nilotica</i> (L.) Willd. ex Del.
<i>I. pervaria:</i>	<i>Acacia</i> sp., <i>Prosopis</i> sp.
<i>I. spissata:</i>	<i>Acacia karroo</i> Hayne
<i>I. sublimbata:</i>	<i>Acacia</i> sp.
<i>Chiasmia aestimaria:</i>	<i>Tamarix africana</i> Poir., <i>T. articulata</i> Vahl (= <i>dioica</i> Roxb.), <i>T. nilotica</i> (Ehrenb.) Bge (= <i>gallica</i> L.), <i>T. pauciovulata</i> J. Gay ex Batt. et Trab.
<i>C. arenosa:</i>	<i>Acacia caffra</i> (Thunb.) Willd.
<i>C. assimilis:</i>	<i>Acacia nilotica</i> (L.) Willd. ex Del.
<i>C. b. brongusaria:</i>	<i>Acacia karroo</i> Hayne (= <i>A. hirtella</i> E. Mey.)
<i>C. contaminata:</i>	<i>Albizia gummifera</i> (J. Gmelin) C.A. Smith
<i>C. diarmodia:</i>	<i>Acacia albida</i> Delile (= <i>Faidherbia albida</i> (Del.) A. Chev.; <i>A. erioloba</i> E. Mey.)
<i>C. feralia:</i>	<i>Sterculia tragacantha</i> Lind.
<i>C. fontainei:</i>	<i>Entada mannii</i> (Oliver) Tisserant
<i>C. furcata:</i>	<i>Acacia karroo</i> Hayne, <i>A. nilotica</i> (L.) Willd. ex Del.
<i>C. getula:</i>	<i>Newtonia buchananii</i> (Bak.) G. Gilbert & Boutique
<i>C. i. inconspicua:</i>	<i>Acacia nilotica</i> (L.) Willd. ex Del.
<i>C. interrupta:</i>	<i>Acacia karroo</i> Hayne, <i>A. swazica</i> Burtt Davy
<i>C. kilimanjarensis:</i>	<i>Brachystegia spiciformis</i> Benth
<i>C. nobilitata:</i>	<i>Entada</i> sp.
<i>C. observata:</i>	<i>Acacia karroo</i> Hayne
<i>C. orthostates:</i>	<i>Helichrysum triplinerve</i> DC.
<i>C. procidata semispurcata:</i>	<i>Acacia karroo</i> Hayne; <i>Rhus lanceolata</i> A. Gray ex Engl. in DC. (= <i>R. lancea</i> L. f.)
<i>C. s. simplicilinea:</i>	<i>Acacia karroo</i> Hayne, <i>A. mollissima</i> Willd. (= <i>A. mearnsii</i> De Wild.), wattle
<i>C. s. streniata:</i>	<i>Acacia karroo</i> Hayne, <i>A. caffra</i> (Thunb.) Willd., wattle; <i>Hippobromus pauciflorus</i> Eckl. & Zeyh., <i>Albizia zygia</i> (DC.) J.F. Macbr.
<i>C. s. subcurvaria:</i>	<i>Acacia karroo</i> Hayne
<i>C. syriacaria:</i>	<i>Prosopis stephaniana</i> (Willd.) Spreng., <i>P. farcta</i> (author?); <i>Glycyrrhiza glabra</i> (L.), <i>C.</i> sp.
<i>C. trigonoleuca:</i>	<i>Erythrophleum suaveolens</i> (Guillemin & Perrottet) (= <i>E. lasianthum</i> Corbishley, ?= <i>guineense</i> G. Don.); <i>Acacia pennata</i> (= <i>A. brevispicata</i> ssp. <i>dregeana</i> (Benth.) Brenan; <i>Mallotus oppositifolius</i> (Geisel.) Mull. Arg.
<i>C. trizonaria:</i>	<i>Acacia karroo</i> Hayne
<i>C. turbulentata:</i>	<i>Acacia karroo</i> Hayne
<i>C. umbrata:</i>	<i>Entada spicata</i> (E. Meyer) Druce (= <i>Adenopodia spicata</i> (E. Mey.) Presl.
<i>C. umbratilis:</i>	<i>Acacia</i> sp.

**Table 2.** Habitat association of southern African Macariini.

Species	Species-group	Page
<b>1. Generalists</b>		
<i>Platypepla persubtilis</i>	—	67
<i>Acanthovalva inconspicuaria</i>	—	34
<i>Isturgia deerraria</i>	14	97
<i>catalanaria</i>	11	76
<i>Chiasmia s. streniata</i>	C9	189
<i>s. simplicilinea</i>	C12	210
<i>turbulentata</i>	C16	226
<i>procidata semispurcata</i>	C16	227
<i>b. brongusaria</i>	C20	245
<b>2. Desert species</b>		
(See Remarks under Desert Biome, above)		
( <i>Acanthovalva inconspicuaria</i> )	—	34
( <i>Isturgia deerraria</i> )	14	97
( <i>Chiasmia diarmodii</i> )	C4	134
( <i>C. i. inaequilinea</i> )	C17	233
<b>3. Species of subtropical and tropical lowland forests</b>		
(Species which in Zimbabwe occur further inland are marked by an asterisk.)		
<i>Platypepla pseudospurcata</i>	—	69
<i>spurcata</i>	—	63
<i>Acanthovalva bilineata</i>	—	37
<i>Isturgia spissata</i>	15	105
<i>dakuduku</i>	12	80
<i>exospilata</i>	13	86
<i>Chiasmia alternata</i>	C5	144
( <i>johnstoni</i> )	C5	145
<i>confuscata</i>	C7	153
<i>sororcula</i>	C7	155
( <i>s. separata</i> )	C7	158
<i>natalensis*</i>	C7	163
<i>inquinata*</i>	C7	167
<i>feralitata</i>	C7	168
<i>a. amarata</i>	C8	171
<i>rectistrigaria*</i>	C13	216
<i>u. umbrata</i>	C10	203
<i>maronga</i>	C10	204
<i>abnormata</i>	—	265
<i>s. subcurvaria</i>	C18	237
<i>interrupta</i>	C22	264
<i>normata</i>	—	269
<i>arenosa</i>	—	266
<i>umbraitilis</i>	C21	260
<b>4. Species of afromontane forests</b>		
The main area of distribution of this group in southern Africa lies in Zimbabwe, from the Inyanga Mountains ( $18^{\circ}13'S$ $32^{\circ}42'E$ ) in the north to Mt. Selinda ( $20^{\circ}27'S$ $32^{\circ}40'E$ ) in the south-east. In South Africa they are confined to a few localities in the escarpment of the Transvaal and northern Natal.		
<i>Chelotephrina acorema</i>	—	72
<i>Chiasmia semicolor</i>	C5	146
( <i>johnstoni</i> )	C5	145
<i>rhabdophora</i>	C5	147
<i>nobilitata</i>	C5	148
<i>infabricata</i>	C6	149
<i>contaminata</i>	C11	207
<i>getula</i>	—	267

**Table 2 cont.** Habitat association of southern African Macariini.

Species	Species-group	Page
<b>5. Fynbos species</b>		
<i>Platypepla mackayi</i>	—	69
<i>Acanthovalva capensis</i>	—	36
<i>Isturgia exerraria</i>	14	96
<i>Chiasmia semitecta</i>	C5	139
<i>i. inaequilinea</i>	C17	233
<i>observata</i>	C18	236
<b>6. Grassland species</b>		
(See remarks under Grassland Biome, above)		
<i>Acanthovalva focularia</i>	—	38
( <i>Chiasmia semitecta</i> )	C5	139
( <i>brunnescens</i> )	C5	139
( <i>i. inaequilinea</i> )	C17	233
<b>7. Nama-Karoo species</b>		
<i>Acanthovalva focularia</i>	—	38
( <i>Chiasmia semitecta</i> )	C5	139
<i>brunnescens</i>	C5	139
<i>i. inaequilinea</i>	C17	233
<i>observata</i>	C18	236
<i>tristis</i>	C20	249
<i>brongusaria exosciodes</i>	C20	247
<i>castanea</i>	C20	250
<b>8. Succulent Karoo species</b>		
<i>Platypepla griseobrunnea</i>	—	65
( <i>Isturgia exerraria</i> )	14	96
<b>9. Savanna species</b>		
<b>9.1 Savanna generalists</b>		
<i>Plateopia acrobelia</i>	—	40
<i>Isturgia arizeloides</i>	15	107
( <i>spissata</i> )	15	105
<i>supergressa</i>	13	85
<i>Chiasmia i. inconspicua</i>	C20	251
<i>trizonaria</i>	C21	258
<i>furcata</i>	C17	232
<i>marmorata</i>	C22	262
<b>9.2 Species of lowveld savanna</b>		
<i>Platypepla macilenta</i>	—	65
<i>Isturgia exospilata</i>	13	86
<i>Chiasmia duplicitinea</i> (Natal)	C8	176
<i>u. umbrata</i>	C10	203
( <i>abnormata</i> )	—	265
<i>interrupta</i>	C22	264
<i>normata</i>	—	269
<i>arenosa</i>	—	266
<i>umbraitilis</i>	C21	260
<b>9.3 Species of lowveld and highveld savanna, excluding the Kalahari Basin</b>		
<i>Platypepla spurcata</i>	—	63
<i>Acanthovalva bilineata</i>	—	37
<i>Isturgia geminata</i>	—	112
<i>Chiasmia tecnum</i>	C2	130
<i>grisescens</i>	C5	140
<i>johnstoni</i>	C5	145
<i>confuscata</i>	C7	153

**Table 2 cont.** Habitat association of southern African Macariini.

Species	Species-group	Page
( <i>sororcula</i> )	C7	155
<i>s. separata</i>	C7	158
( <i>feraliata</i> )	C7	168
<i>deceptrix</i>	C8	175
<i>m. ualitistrigata</i>	C14	219
<i>curvifascia</i>	C15	223
<i>s. subcurvaria</i>	C18	237
<i>kirbyi</i>	C19	239
<i>vau</i>	C19	240
<i>assimilis</i>	C20	252
<i>suriens</i>	C21	256
<b>9.4 Species of the Kalahari Basin</b>		
<i>Platypepla jordani</i>	—	64
<i>Chiasmia diarmodia</i>	C4	134
<i>ngami</i>	C4	135
<i>inaequilinea erebias</i>	C17	234
<i>brongusaria exosciodes</i>	C20	247
<b>9.5 Species confined to savanna in central and northern Namibia</b>		
<i>Platypepla lorauthiphaga</i>	—	66
<i>Chiasmia zobrysi</i>	C14	221
( <i>i. inaequilinea</i> )	C17	233
<b>9.6 Species with continuous distribution from Namibia to the Transvaal and south-western Zimbabwe</b>		
<i>Platypepla flava</i>	—	66
<i>Chiasmia multistrigata</i>	C14	219
<i>griminia</i>	C17	235
<i>punctilinea</i>	C19	242
<i>ammodes</i>	C20	254

**Table 2 cont.** Habitat association of southern African Macariini.

Species	Species-group	Page
<b>9.7 Species with centre of distribution in Zimbabwe</b>		
<i>Milocera aurora</i>	Mi4	51
<i>dubia</i>	Mi7	58
<i>Isturgia perplexa</i>	—	113
<i>Chiasmia nubilata</i>	C4	135
<i>extrusilinea</i>	C4	136
<i>nurina</i>	C5	141
<i>hunyani</i>	C5	142
<i>melsetter</i>	C5	142
<i>deleta</i>	C5	143
<i>bomfordi</i>	C5	142
<i>pinheyi</i>	C5	143
<i>nevilledukei</i>	C6	150
<i>parallacta</i>	C7	161
<i>kilitmanjarensis</i>	C12	214
<i>boarmioides</i>	C15	223
<i>semiolivacea</i>	C19	242
<i>costicommata</i>	C19	244
<b>10. Foreign elements</b>		
(Chief area of distribution in the Afrotropical region in round brackets.)		
<i>Isturgia triseriata</i> (E. Africa)	I1	79
<i>Chiasmia threnopsis</i>		
(tropical W. Africa)	C7	165
<i>fuscataria</i> (tropical W. Africa)	C7	156
<i>paucimacula</i> (tropical Africa)	C7	161
<i>orientalis</i> (E. Africa)	C8	179
<i>subvaria</i> (widely distributed)	C8	183
<i>geminilinea</i> (E. Africa)	C8	182
<i>m. majestica</i> (tropical Africa)	C13	217
<i>unifilata</i> (widely distributed)	C15	224
<i>nana</i> (tropical W. Africa)	—	268
<i>crassata</i> (widely distributed)	C19	241

**Table 3.** General habitat preferences of species-groups of *Isturgia* and *Chiasmia*.

Species-groups	southern		
African species	habitat	preference	
<i>I. catalaunaria</i> -group	3	savanna	
<i>sakalava</i> -group	1	subtropical coastal forest	
<i>supergressa</i> -group	2	forest; savanna	
<i>disputaria</i> -group	2	fynbos; savanna	
<i>presbitaria</i> -group	4	savanna	
<i>C. tecnum</i> -group	1	savanna	
<i>nubilata</i> -group	4	Kalahari; savanna in Zimbabwe	
<i>semitecta</i> -group	14	afromontane	
<i>infabricata</i> -group	2	afromontane	
<i>trirecurva</i> -group	10	forest; frost-free savanna	
<i>amarata</i> -group	6	afromontane; forest; frost-free savanna	
<i>aestimaria</i> -group	1	generalist	
<i>crassilembaria</i> -group	2	forest; frost-free savanna	
<i>contaminata</i> -group	1	afromontane	
<i>simplicilinea</i> -group	2	generalist; savanna in Zimbabwe	
<i>rectistrigaria</i> -group	2	forest; frost-free savanna	
<i>multistrigata</i> -group	2	savanna	
<i>curvifascia</i> -group	3	savanna	
<i>procidata</i> -group	2	savanna	
<i>furcata</i> -group	3	savanna, incl. arid zone	
<i>observata</i> -group	2	Karoo; frost-free savanna	
<i>kirbyi</i> -group	6	savanna	
<i>brongusaria</i> -group	7*	savanna, incl. arid zone	
<i>otindaria</i> -group	4*	savanna	
<i>marmorata</i> -group	2	savanna	

**Table 4.** Endemism and species-groups of Madagascan Macariini.

Species	Status	Species-group
<i>Milocera horaria</i>	Endemic	Mi1
<i>Sphyrocosta madecassa</i>	Endemic	—
<i>Acanthovalva itremo</i>	Endemic	—
<i>Isturgia univirgaria</i>	Endemic	I2
<i>sakalava</i>	Endemic	I3
<i>contexta</i>	Endemic	I4
<i>modestaria</i>	Endemic	I4
<i>averyi</i>	Endemic	I4
<i>comorensis</i>	Endemic	I4
<i>deerraria</i>	African	I5
<i>griveaudi</i>	Endemic	I5
<i>Chiasmia banian</i>	Endemic	C2
<i>orthostates</i>	Endemic	C5
<i>trirecura</i>	Endemic	C7
<i>malgassofusca</i>	Endemic	C7
<i>separata conjugata</i>	Endemic ssp.	C7
<i>livorosa</i>	Endemic	C7
<i>coronoleucas</i>	Endemic	C7
<i>insulicola</i>	Endemic	C7
<i>megalesia</i>	Endemic	C8
<i>strenitaria arata</i>	Endemic ssp.	C9
<i>herbuloti</i>	Endemic	C9
<i>tetragraphicata</i>	Endemic	C9
<i>hypactinia</i>	Endemic	C9
<i>tsaratanana</i>	Endemic	C9
<i>crassilembaria</i>	Endemic	C12
<i>umbrata juvenilis</i>	Endemic ssp.	C12
<i>simplicilinea pagenstecheri</i>	Endemic ssp.	C15
<i>avitusarioides</i>	Endemic	C16
<i>normata</i>	Old World tropical	—
<i>'Semiothisa' peyrierasi</i>	Endemic	—
<i>[Malgassothisa trifida]</i>	Endemic	—

**Table 5.** Likely macariine sister-taxa between Madagascar and the African mainland.

Madagascan endemic	African sister-taxon
<i>Milocera horaria</i>	?
<i>Sphyrocosta madecassa</i>	<i>Plateoplia acrobelia</i> ?
<i>Acanthovalva itremo</i>	<i>Acanthovalva bilineata</i>
<i>Isturgia griveaudi</i>	<i>Isturgia quadriplaga</i>
<i>sakalava</i>	<i>dukudu</i>
<i>univirgaria</i>	<i>catalaunaria</i>
<i>contexta, modestaria</i>	<i>supergressa</i>
<i>comorensis</i>	<i>prionogyna</i>
<i>averyi</i>	?
<i>Chiasmia banian</i>	<i>Chiasmia tecnum</i>
<i>orthostates</i>	<i>johnstoni</i>
<i>trirecura</i>	<i>confuscata</i>
<i>malgassofusca</i>	<i>fuscataria</i>
<i>livorosa, neolivorosa</i>	<i>separata</i>
<i>coronoleucas</i>	<i>natalensis</i>
<i>insulicola</i>	<i>inquinata</i>
<i>megalesia</i>	<i>duplicilinea</i>
<i>hypactinia, tsaratanana</i>	?
<i>herbuloti, tetragraphicata</i>	?
<i>avitusarioides</i>	<i>majestica</i>
<i>crassilembaria</i>	<i>maronga</i>
<i>'Semiothisa' peyrierasi</i>	?

**Table 6.** Character matrix, macariine genera.

<i>Zamarada</i>	02000	03000	310
<i>Acanthovalva</i>	22230	01211	002
<i>Boarmioides</i>	22220	02000	211
<i>Cletolephrina</i>	00202	12000	130
<i>Chiasmia</i>	21342	15100	240
<i>Isturgia</i>	11210	12100	210
<i>Itame</i>	12220	02000	220
<i>Macaria</i>	22342	14100	210
<i>Malgassothisa</i>	00400	05200	500
<i>Milocera</i>	22121	20011	002
<i>Narraga</i>	20200	02211	020
<i>Plateoplia</i>	22210	11011	001
<i>Platypepla</i>	22110	20011	002
<i>Semiothisa</i>	20340	16100	450
<i>Sphyrocosta</i>	20120	00201	001
<i>Tephrina</i>	12210	12000	210

**Table 7.** Characters and character states, macarinae genera.

1. Chaetosemata: arrangement. Arranged in two separate groups (0); not strongly extended (1); transversely elongated (2)
2. Fovea: development. Absent (0); incompletely formed (1); completely formed (2)
3. Adult: general facies. Postmedian area wide, contrasting with basal part of wing (*Zamarada*-pattern) (0); small, ochreous forms with reduced markings (1); medium-sized, grey-ochreous moths with well-developed postmedian line only (*Isturgia*-pattern) (2); variously coloured, often with 'tailed' hind wings (*Chiasmia*-pattern) (3); orange moths with fine postmedian line and prominent discal spots (*Malgassothisa*-pattern) (4)
4. Abdomen of ♂: eighth sternite. Unmodified (0); midventral thickening of cuticle or weakly sclerotized lip (1); weakly sclerotized, w-shaped (2); small octavals (3); strongly developed octavals (4)
5. Abdomen of ♂: third sternite. Unmodified (0); setal patch present (1); setal comb present (2)
6. Antennae of ♂: structure. Bipectinate (0); serrate (1); ciliate (2)
7. Uncus: form and vestiture. Attenuated, naked or setose (0); triangular, setose (1); dome-shaped, setose (2); dome-shaped with lateral lobes (3); trapezoidal with a pair of sclerotized 'horns', subuncus sclerite absent (4); as 4., subuncus sclerite present (5); trapezoidal, uncus 'horns' secondarily lost (6).
8. Gnathos: form. Cingulate, with massive central body (0); deeply emarginate with slender arms (1); absent (2)
9. Valve: vestiture. Naked or setose (0); spiniferous (1)
10. Valve: separation of costa and sacculus. Separation incomplete (0); separation more or less complete (1)
11. Valve: general shape. Costa slender to subtriangular, sacculus broadly to narrowly triangular, occasionally with sword-like process arising from base (0); costa narrow, curved; sacculus rounded or cleft apically (1); costa fairly stout, with or without ventral process; sacculus triangular to rounded, incompletely separated (2); costa narrow, recurved; sacculus broader, variously shaped (3); costa thin, strongly recurved, sacculus a broadly rounded lobe (4); valve trifid (5)
12. Ductus bursae: antrum. Absent (0); calyx-shaped, with well-developed operculum (*Isturgia*-type) (1); extended, with long sclerotized bands (*Narraga*-type) (2); evenly sclerotized, with small operculum (*Chelotephria*-type) (3); shell-shaped (*Chiasmia*-type) (4); prominent, hood-shaped (*Semiothisa*-type) (5)
13. Corpus bursae: texture of wall. Membranous, signum present (0); membranous, signum reduced (1); instrate (2)

**Table 8.** Number of changes of state, consistency index and retention index values for tree 3 (length 224, CI 54, RI 73) from analysis 1 of macarinae genera; 13 characters analysed.

Tree 3													
Character	1	2	3	4	5	6	7	8	9	10	11	12	13
Steps	3	8	7	10	7	4	11	5	2	1	8	11	4
CI	66	25	57	40	28	50	54	40	50	100	62	40	50
RI	85	40	50	60	0	71	66	70	75	100	78	50	71
Best fits													
Character	1	2	3	4	5	6	7	8	9	10	11	12	13
Steps	2	8	7	9	5	3	11	5	2	1	8	11	4
CI	100	25	57	44	40	66	54	40	50	100	62	45	50
RI	100	40	60	66	40	85	66	70	75	100	78	50	71
Worst fits													
Character	1	2	3	4	5	6	7	8	9	10	11	12	13
Steps	4	8	7	11	7	5	11	6	2	1	8	11	4
CI	50	25	57	36	20	40	54	33	50	100	62	45	50
RI	71	40	50	53	0	57	66	60	75	100	78	50	71

**Table 9.** Character matrix, *Isturgia* species-groups.

<i>P. acrobelia</i>	00000 01001 00031 0
<i>I. deerraria</i> group	21251 63030 31221 2
<i>I. presbitaria</i> group	41251 73030 41321 2
<i>I. catalaunaria</i> group	20131 21021 11121 2
<i>I. sakalava</i> group	20121 10010 11101 1
<i>I. supergressa</i> group	10141 401?0 51?20 2
<i>I. miniosaria</i>	20141 20020 21111 3
<i>I. geminata</i>	00110 30011 11101 0
<i>I. devecta</i>	20241 52010 601?1 4
<i>I. perplexa</i>	30221 82??? ???21 2
<i>T. murinaria</i>	20221 21021 10101 2

**Table 10.** Characters and character states, *Isturgia* species-groups.

1. Uncus: form. Triangular, attenuate (0); apex inserted into broad base (1); dome-shaped, setose (2); mitre-shaped (3); semicircular, with inwardly directed tip (4)
2. Gnathos: form. Cingulate (0); angular (1)
3. Valve: shape of costa. Short, curved, somewhat truncate (0); longer, curved, rounded (1); long, ± straight (2)
4. Valve: sacculus. Produced into curved, finger-like process (0); produced into short, curved process (1); bilobate, 2/3 coincident with costa (2); triangular, acutely pointed (3); triangular, rounded, inner margin smooth (4); triangular, rounded, inner margin finely serrated (5)
5. Saccus: form. Broadly rounded, hardly protruding from valvae (0); expanded, forming ± pronounced tip (1)
6. Aedeagus: cornuti on vesica. Absent (0); series of microcornuti (denticles) (1); microcornuti and larger cornuti present (2); compound cornutus consisting of numerous microcornuti (3); two very long, nail-like cornuti present (4); a row of apical microcornuti present; dorsal part of aedeagus sclerotized (5); combination of smooth and scobinate cornuti present (6); rod-like apical and stout median cornutus present (7); two elongated, slightly twisted cornuti present (8)
7. Octavals. Absent (0); narrow sclerotized ridge (1); weakly sclerotized, with developing cleft (2); strongly sclerotized, clearly cleft, inner margin serrated (3)
8. Corpus bursae: texture of wall. Membranous (0); leathery, partly instrate (1)
9. Corpus bursae: signum; size and length of spicula. Signum absent (0); small signum with short spicula (1); signum and spicula medium-sized (2); large signum with very long spicula (3)
10. Sterigma: lamella postvaginalis. Not modified (0); modified (1)
11. Ductus bursae: antrum. Absent (0); simple, with sclerotized bands on margin (1); sclerotized bands larger, moving towards centre (2); covered by rounded operculum, large (3); covered by pointed operculum, large (4); extremely developed and replacing ductus bursae (5); swollen, sclerotized bands absent (6)
12. ♀ genitalia: operculum. Absent (0); present (1)
13. Ductus bursae: prae-antral section. Membranous, largely smooth (0); membranous, ribbed (1); with large, patchy sclerotizations (2); greatly elongated and heavily sclerotized (3)
14. ♂ antennae: structure. Shortly bipectinate throughout (0); bipectinate with long pectinations (1); bipectinate, pectinations very short distally (2); serrate (3)
15. ♀ antennae: structure. Ciliate (0); shortly bipectinate (1)
16. Adult: habitus. Small, yellowish or whitish-grey moths (0); barely medium-sized moths with *Macaria*-like wing pattern (1); medium-sized to large moths with simple wing pattern (2); large moths with densely speckled wings (3); medium-sized moths with bark-like wing pattern (4)

**Table 11.** Number of changes of state, consistency index and retention index values for tree (length 321, CI 76, RI 77) from analysis 2 of *Isturgia* species-groups; 16 characters analysed.

Character	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Steps	6	1	3	7	1	11	6	1	4	2	8	3	3	6	1	5
CI	66	100	66	71	100	72	50	100	75	50	75	33	100	50	100	80
RI	50	100	75	80	100	80	57	100	75	66	80	0	100	40	100	75

**Table 12.** Character matrix, *Chiasmia* species-groups.

Ancestor	00000 00000 00000 00000 000
<i>C. puerilis</i> group	10000 00000 20000 00000 034
<i>C. trinotata</i> group	21111 01001 01001 00001 101
<i>C. diarmodia</i> group	21111 01001 11011 01001 014
<i>C. tecnum</i> group	21111 01001 11001 00002 021
<i>C. semitecta</i> group	21111 12001 01111 00002 204
<i>C. trirecurva</i> group	21111 41001 11212 00002 304
<i>C. infabricata</i> group	21111 13002 11233 00002 400
<i>C. amarata</i> group	21112 41002 11222 00002 304
<i>C. ostentosaria</i> group	21112 41103 11322 00002 304
<i>C. rectistrigaria</i> group	21113 34004 01374 00002 504
<i>C. simplicilinea</i> group	21113 20002 11164 10002 504
<i>C. contaminata</i> group	21112 61002 11102 00003 404
<i>C. crassilembaria</i> group	21112 41002 11242 03004 304
<i>C. abnormata</i>	21114 41005 11364 00013 602
<i>C. brongusaria</i> group	21116 41002 11242 00003 601
<i>C. olindaria</i> group	21117 41007 11242 00103 601
<i>C. furcata</i> group	21115 41006 11042 00003 602
<i>C. observata</i> group	21115 41003 11246 00003 601
<i>C. kirbyi</i> group	21116 41012 11245 00003 600
<i>C. marmorata</i> group	21118 51026 11256 00103 603
<i>C. procidata</i> group	21115 40003 11002 00003 703
<i>C. multistrigata</i> group	21115 70002 11246 00003 224
<i>C. curvifascia</i> group	21115 80033 11006 12003 203

**Table 13.** Characters and character states, *Chiasmia* species-groups.

1. Uncus: shape/inner structure. Triangular/not modified (0); trapezoidal, apex indented, subuncus sclerite rudimentary (1); as for 1./subuncus sclerite complete (2)
2. Uncus: development of chitinized 'horns'. Absent or hardly larger than setae (0); fully developed, erect (1)
3. Uncus: distribution of setae on ventral surface. Evenly setose (0); setae in two groups on either side of base (1)
4. Gnathos: form. Cingulate, lateral arms broad (0); deeply emarginate, lateral arms slender (1)
5. Valve: shape of costa. Simple, straight, may be ventrally dilated (0); stout, spatulate (1); massive, stout, elongated, with or without ventral process (2); curved with broad ventral process, may be dilated to form spatula with serrated ridge (3); slender, straight, with short ventral process near base (4); moderately strong, straight, with or without ventral process (5); straight or slightly recurved, ventral process present (6); as for 6, but stouter, apex well rounded (7); ventral process strongly developed, leaf-like (8)
6. Valve: shape of sacculus. Short, triangular, squarish or rounded (0); strongly rounded, protruding (1); triangular, terminating in point arising from inner margin (2); very broad, rounded, apex with sclerotized bar (3); rounded to squarish, may be produced into ± process (4); triangular, with elaborate ornament (5); truncate, short (6); truncate, long (7); triangular, slender, point not arising from inner margin (8)
7. Valve: armature of sacculus. Unarmed (0); small sclerotizations, confined to apex (1); discrete serrations, may be band-like (2); sinuate sclerotized band (3); T-shaped sclerotized ridge on tip of sacculus (4)
8. Valve: presence of valvula. Absent (0); present (1)
9. Saccus: development. Broadly rounded, hardly protruding from valvae (0); ditto, base concave (1); protruding, base concave or truncate (2); protruding, forming ± narrow tip (3)
10. Aedeagus: form. Stout, wedge-shaped (0); relatively small, ± cylindrical (1); medium-sized, ± fusiform (2); elongated, cylindrical or fusiform (3); elongated, with a sclerotized subapical hook (4); curved, short, with pointed apex and truncate end (5); as above, elongated (6); short, stout, with discrete dorsal sclerotization (7)
11. Aedeagus: sclerotizations. Absent (0); microcornuti and/or striations (1); larger cornuti present (2)
12. Octavals: development. Absent or very faint (0); well developed (1)
13. Sterigma: general development. Both lamellae unmodified (0); only l. antevaginalis modified (1); only l. postvaginalis modified (2); both lamellae modified (3)
14. Sterigma: lamella postvaginalis. Absent (0); forming small sclerotizations at base of antrum (1); larger, forming ± elliptical 'ears' (2); split into larger posterior and smaller anterior pair of processes (3); forming lateral, ± walnut-shaped sclerotizations on sides of ostium (4); long processes, originating from ostium and extending anteriorly (5); membranous, weakly sclerotized, extending posteriorly (6); highly ornamented (7)
15. Ductus bursae: antrum. Very small and inconspicuous (0); of similar structure but larger (1); medium-sized, shell-shaped or pentagonal (2); shell-shaped, very large (3); secondarily reduced, short, cylindrical (4); short and round, with wide-mouthed ostium (5); elongated, funnel-shaped (6)
16. ♀ genitalia: presence of cone-shaped operculum. Absent (0); present (1)
17. ♀ genitalia: connection between antrum and membranous part of ductus bursae. Straight (0); ductus extending beyond antrum for a short distance (1); ductus curled posteriorly, extending beyond antrum for a long distance (2); antrum large, funnel-shaped, joining membranous ductus anteriorly (3)
18. Corpus bursae: signum. Present (0); absent (1)
19. Bursa copulatrix: bulla seminalis. Absent (0); present (1)
20. Adult: general facies. Very small moths with rounded hind wings (0); small moths with rounded hind wings (1); small to large moths with tailed hind wings (2); medium to (rarely) large moths with rounded hind wings (3); moths with narrow fore wings and crenulated hind wings (4)
21. Adult: pattern on underside of hind wing. Pattern absent or very simple (0); *Trinotata*-pattern (1); *Semitecta*-pattern (2); *Amarata*-pattern (3); *Contaminata*-pattern (4); *Simplicilinea*-pattern (5); *Brongusaria*-pattern (6); *Procidata*-pattern (7)
22. Adult head: frons. Frons not protruding (0); with round, knob-like protuberance (1); with cylindrical protuberance (2); with horseshoe-shaped prominence (3)
23. Antennae of ♂: structure. Bipectinate with long pectinations (0); bipectinate with short pectinations (1); serrate with very short cilia (2); serrate with laterally flattened serrations, cilia fasciculate (3); ciliate (4)

**Table 14.** Number of changes of state, consistency index and retention index values for tree 9 (length 498, CI 58, RI 80) from analysis 3 of *Chiasmia* species-groups; 23 characters analysed.

Tree 9																							
Character	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Steps	2	1	1	1	12	15	10	1	6	20	5	1	11	20	9	2	6	2	1	7	13	8	19
CI	100	100	100	100	66	53	40	100	50	35	40	100	27	35	66	50	50	50	100	57	53	37	21
RI	100	100	100	100	90	77	25	100	0	45	0	100	57	68	89	0	0	0	100	80	85	0	46
Best fits																							
Character	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Steps	2	1	1	1	11	15	10	1	5	17	5	1	11	15	8	2	6	2	1	7	13	8	19
CI	100	100	100	100	72	53	40	100	60	41	40	100	27	46	75	50	50	50	100	57	53	37	21
RI	100	100	100	100	92	77	25	100	33	58	0	100	57	80	92	0	0	0	100	80	85	0	46
Worst fits																							
Character	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Steps	2	1	1	1	15	16	10	1	6	20	5	1	12	20	11	2	6	2	1	7	15	8	20
CI	100	100	100	100	53	50	40	100	50	35	40	100	25	35	54	50	50	50	100	57	46	37	20
RI	100	100	100	100	82	74	25	100	0	45	0	100	52	68	82	0	0	0	100	80	80	0	42

## APPENDIX

### GAZETTEER

In the following gazetteer localities are listed alphabetically followed by the province or, for localities outside South Africa, the name of the countries. Abbreviations: RNI (Réserve naturelle intégrale).

Due to the absence of major settlements, many locality labels attached to South African specimens have just the name of the farm cited where the specimen was collected. These localities are listed in the Gazetteer under 'Farm'.

Latitude and longitude of numerous Madagascan localities could not be determined. In these cases the information provided by Viotte (1991) is quoted.

- Abachaus (also Abachaub), Namibia  
19°50'S 16°30'E
- Abassena, Ethiopia ?= Abasswen, Somalia  
10°56'N 42°50'E
- Abera Forest, Gulu, Uganda 2°50'N  
32°22'E
- Abercorn, Zambia (now Mbala) 8°50'S  
31°22'E
- Aberdare Mts., Marigat, Kenya 0°40'S  
36°00'E
- Aberfoyle, Honde Valley, Zimbabwe  
c.18°30'S 32°50'E
- Abha, Saudi Arabia 18°10'N 42°25'E
- Abraham's Kraal, Free State 28°45'S  
25°36'E
- Aburi, Gold Coast 5°53'N 0°08'E
- Adamawa region, Cameroon c.8°20'N  
11°20'–15°20'E
- Aden, Yemen c.12°45'N 45°00'E
- Addo, Eastern Cape 33°29'S 25°45'E
- Addo Bush, Eastern Cape 34°30'S 25°45'E
- Adis Abeba, Ethiopia 9°02'N 38°42'E
- Ado-Ekiti, Nigeria 7°38'N 5°13'E
- Afgoi, Somalia 2°10'N 45°07'E
- Afindo, Unyoro, Uganda – not traced
- Agadir, Morocco c.30°35'N 9°25'W
- Ahoos, Kenya – not traced
- Aiwea, Kenya – not traced
- Akbes, Syria – not traced
- Akka, Israel 32°55'N 35°07'E
- A'koon, Gold Coast – not traced
- Al-Alayyah, Saudi Arabia – not traced
- Albert Falls, KwaZulu-Natal 29°25'S  
30°25'E
- Alexander Bay, Northern Cape 28°41'S  
16°30'E
- Al-Foqa, Saudi Arabia – not traced
- Algeria Forestry, Clanwilliam Distr.,  
Western Cape 32°23'S 19°03'E
- Algiers, Algeria 36°50'N 2°55'E
- Aliwal North, Eastern Cape 30°42'S  
26°42'E
- Amahlongwa [Mission], KwaZulu-Natal  
29°02'S 31°02'E
- Amani, Tanzania 5°06'S 38°38'E
- Amatonga Forest, Moçambique 19°05'S  
33°32'E
- Ambahona Forest, C. Madagascar see  
Ankaratra Massive
- Ambanja, Madagascar Sambirano 16°25'S  
48°25'E
- Ambatofinandrahana, C. Madagascar  
21°05'S 46°50'E
- Ambatofitorahana, C. Madagascar –  
Betsileo County, Nat. Road 7 at km 295
- Ambatovositra, C. Madagascar – RNI no.
3. Andranomalaza  
Ambinanindrano, E. Madagascar – 70–80  
km SW. of Mahanoro
- Ambinanitelo, Sambava Distr., E.  
Madagascar 14°15'S 50°03'E
- Amboasary, Ambovombe, S. Madagascar  
25°01'S 46°25'E
- Ambodiriana, E. Madagascar –  
Moramanga underprefecture, Lakato  
road at km 10
- Ambohimanga, C. Madagascar 20°55'S  
47°45'E
- Ambohimandrana, C. Madagascar – see  
Ankaratra Massive
- Amboim, Cuanza Sul Prov., Angola  
10°51'S 14°22'E
- Ambositra, C. Madagascar 20°30'S 47°15'E
- Ambovombe, S. Madagascar 25°10'S  
46°08'E
- Ampanihy, S. Madagascar 24°33'S 44°42'E
- Ampijoroa, Ankafantsika Forest, W.  
Madagascar – Marovoay  
underprefecture, 25 km N. of Ambato-  
Boeni
- Andapa, E. Madagascar 14°39'S 49°45'E
- Analalava Forest, N. Madagascar c.13°40'S  
50°00'E
- Analamazaotra Forest, E. Madagascar –  
Moramanga underprefecture, Périeret  
region
- Analamerana Forest, N. Madagascar  
c.12°45'S 49°35'E
- Analavelona Massive, C. Madagascar  
22°35'S 44°10'E
- Andara, Okavango, Namibia 18°01'S  
21°28'E
- Andaromihomaka Forest, W. Madagascar –  
nat. road 7 (from Tulear) at km 892
- Andilambe, Madagascar Sambirano – W.  
Tsarananana Massive
- Andobo, W. Madagascar – Antsalova  
underprefecture, RNI no.9
- Andohanambatoao, Madagascar  
Sambirano, S. Tsarananana Massive
- Andohariana Plateau, C. Madagascar –  
part of Andringitra Massive
- Andranomangara Forest, E. Madagascar –  
Andohalelo Massive, NW. of Fort  
Dauphin
- Andranotobaka, Ambatolampy, C.  
Madagascar 19°25'S 47°25'E
- Andranovory (also incorrectly –vary)  
Forest, W. Madagascar 23°13'S 44°15'E
- Andringitra Massive, C. Madagascar – S.  
of Ambalavao, RNI 5
- Anenous, Northern Cape 29°14'S 17°35'E
- Angavobe, C. Madagascar – see  
Angavokely Forestry Station
- Angavokely Forestry Station, C.  
Madagascar – Manjakandriana  
underprefecture
- Angustino Farm, Revue Sta., Moçambique  
c.20°05'S 30°44'E
- Anjouan Island, Comoro Islands 12°05'S  
44°40'E
- Anjozorobe, C. Madagascar 18°27'S  
47°55'E
- Ankalirano, S. Madagascar – Ampanihy  
underprefecture
- Ankaratra Massive, Manjakotombo, C.  
Madagascar c.19°20'S 47°10'E
- Ankasoka, E. Madagascar – Moramanga  
underprefecture, Lakato road at km 15
- Ankazomivady, Ambositra, C. Madagascar  
c.20°25'S 47°25'E
- Ankole, Uganda 0°30'S 30°30'E
- Ankorika, N. Madagascar – on north coast  
near Diego Suarez
- An Naamah, Saudi Arabia – not traced
- An Nimas, Saudi Arabia 19°02'N 42°10'E
- Anosibe Road, E. Madagascar c.19°30'S  
48°15'E
- Antanamdehibe, E. Madagascar –  
Vatomandry prefecture
- Antananarivo (also Tananarivo,  
Tananarive), C. Madagascar 18°57'S  
47°25'E
- Antoroka Valley, E. Madagascar see  
Farankaraina For. Sta.
- Antsalova, W. Madagascar – Antsalova  
underprefecture
- Archer's Post, Kenya 0°39'N 37°41'E
- Ariana Djebel, Tunisia 36°52'N 10°11'E
- Arusha, Tanzania 03°22'S 36°41'E
- Asab, Namibia 25°28'S 17°57'E
- Ashaira, Arabia – not traced
- Ashton, Eastern Cape 30°01'S 29°14'E
- Asmara, Eritrea, Ethiopia 11°15'N 41°32'E
- As Nimas, Saudi Arabia – not traced
- Atteia, Tunisia ?= Bir Attia 35°58'N 9°35'E
- Athi (also Athi) River, Kenya 1°27'S  
36°59'E
- Athi (Athi) Valley, Kenya 1°23'S 37°07'E
- Augrabies, Northern Cape 28°38'S 20°21'E
- Antsingy Forest, W. Madagascar – see  
Andobo
- Ayos, Nyong galleries, Cameroon 3°50'N  
11°51'E
- Azare, N. Nigeria 10°27'N 12°07'E
- Azrou, Morocco c. 33°30'N 5°15'W
- Babango (also Babangu), Cameroon – not  
traced

- Bab-Rmila, Morocco – not traced  
 Badr, Arabia – not traced  
 Bafia, Cameroon 4°45'N 11°14'E  
 Bafut (also Bafout) Nguemba Forest, Cameroon 6°05'N 10°06'E  
 Bagani, Kavango, Namibia 18°04'S 21°37'E  
 Baia de Maputo, Moçambique 26°00'S 32°40'E  
 Baie d'Antongil, Hiaraka, E. Madagascar 16°00'S 49°50'E  
 Baigacum (Bayrakkum), Syr-Darja, Kazakhstan c.42°05'N 67°30'E  
 Bailundo (also Bailundo), Angola 12°13'S 15°52'E  
 Bakgatla (also Bakhatla) region, Botswana c.24°25'S 26°22'E  
 Balgowan, KwaZulu-Natal 29°24'S 30°03'E  
 Balla Balla, Zimbabwe (now Mbalabala) 20°25'S 29°03'E  
 Bamenda, Cameroon 5°56'N 10°10'E  
 Banagi Hill, Musoma, Tanzania 2°18'S 34°50'E  
 Banana, Zaire 6°00'S 12°25'E  
 Banda, Cameroon – ambiguous  
 Bandalamadji, Grande Comore, Comoro Islands c.11°40'S 43°35'E  
 Banga Ngola, Angola see Dange Angola  
 Banian, SW. Madagascar – in extreme S. of Manja underprefecture, on Mangoky river  
 Basket, Zimbabwe 17°25'S 30°20'E  
 Banti Forest, Chitara Hills, Zimbabwe – not traced  
 Barberton, Mpumalanga 25°47'S 31°03'E  
 Bare, Cameroon 4°59'N 14°28'E  
 Baringo, Kenya 0°28'N 35°58'E  
 Barotseland, Zambia c.15°30'S 23°15'E  
 Barrage Cavagnac, Ht. Atlas, Morocco – not traced  
 Bashee, Transkei, Eastern Cape 31°53'S 28°55'E  
 Bashoe (Bashee) River, Transkei, Eastern Cape 32°15'S 28°54'E  
 Batna, Algeria 35°30'N 6°20'E  
 Batroka, S. Madagascar – not traced  
 Batt, Benguella Prov., Angola c.12°30'S 13°30'E  
 Baviaanskloof Mts., Eastern Cape 33°25'S 23°45'E  
 Bayota Forest, Gagnoa, Ivory Coast c.6°10'N 5°50'W  
 Beacon Bay, Eastern Cape 33°01'S 27°58'E  
 Beaufort West, Western Cape 32°21'S 22°35'E  
 Befasy Forest, W. Madagascar – 45 km SE. of Morondava  
 Behara, S. Madagascar 24°55'S 46°30'E  
 Beheloka, S. Madagascar – Betsioky Sud underprefecture, N. of Lake Tsimannampetsotsa  
 Beirut, Lebanon 33°57'N 35°25'E  
 Beit Bridge, Zimbabwe 22°10'S 30°05'E  
 Belalona, E. Madagascar – on Sambava-Andapa road, 30 km SW. of Sambava  
 Bela Vista, Moçambique 26°20'S 32°40'E  
 Belingwe, Zimbabwe 21°25'S 29°58'E  
 Bellerode, Namibia 22°34'S 17°08'E  
 Beloha, S. Madagascar 25°10'S 45°05'E  
 Bena Dibebe, Sankuru Kasai, Zaire 4°07'S 22°50'E  
 Benguella, Angola 12°30'S 13°35'E  
 Benitogebiet, Rio Muni & Fernando Póo 1°30'N 9°45'E  
 Beparasy, E. Madagascar – Moramanga underprefecture, new Beparasy road at km 25  
 Berbera, Somalia 10°25'N 45°02'E  
 Bergville, KwaZulu-Natal 28°42'S 29°20'E  
 Bergvliet Forestry, Sabie Distr., Mpumalanga 25°04'S 30°53'E  
 Berlin Forestry, Mpumalanga 25°34'S 30°43'E  
 Besanetribe Valley, Madagascar Sambirano – Tsaratanana counterforts  
 Besanetrikely Valley, Madagascar Sambirano – Tsaratanana counterforts  
 Besil, Kenya see Ilbisil  
 Bethlehem, Free State 28°15'S 28°12'E  
 Betty's Bay, Western Cape 34°22'S 18°55'E  
 Biano (Ditanto), Katanga, Zaire 10°13'S 26°04'E  
 Bibundi, Cameroon 4°13'N 8°59'E  
 Bigugu, Nyungwe Forest, Rwanda – not traced  
 Billo, Ethiopia 8°54'N 36°59'E  
 Bindura, Zimbabwe 17°21'S 31°21'E  
 Bingerville, Ivory Coast 5°21'N 3°54'W  
 Birchenough Bridge, Zimbabwe 19°55'S 32°22'E  
 Birunga Mts., Uganda see Virunga  
 Bisha, Mithab, SW. Najd, Saudi Arabia 20°30'N 42°20'E  
 Biskra, Algeria 34°50'N 5°55'E  
 Bismarckburg, Togo 8°11'N 0°41'E  
 Bitye (also Bitje), Ja River, Cameroon 3°01'N 12°22'E  
 Blaauwkrantzpass on Garden Route, Eastern Cape 33°32'S 25°23'E  
 Black Mountains, Zimbabwe 19°30'S 32°50'E  
 Blaney, Eastern Cape 32°51'S 27°31'E  
 Blantyre, Malawi 15°47'S 35°00'E  
 Blaukop, Blauw's Kop, Upington, Northern Cape 28°43'S 21°08'E  
 Bled Tahla, Algeria – not traced  
 Bloemfontein, Free State 29°07'S 26°13'E  
 Bloemhof, North-West 27°39'S 25°36'E  
 Blouberg, Northern Province 23°05'S 29°00'E  
 Blouhergstrand, Western Cape 34°20'S 18°25'E  
 Blumfelde, Namibia 23°34'S 18°19'E  
 Blyde River Nature Reserve, Northern Province 24°15'S 30°50'E  
 Bobo, Upper Volta = Bobo Dioulassa 11°12'N 4°18'W  
 Bobomene (= Anthrax Camp), Northern Province 22°27'S 31°21'E  
 Boby, Pic, Andringitra Massive, C. Madagascar 22°20'S 46°52'E  
 Boekenhoutskloof, Gauteng 25°33'S 28°29'E  
 Boghé (also Bogué), Mauritania 16°35'N 14°16'W  
 Bon Accord, Northern Province 25°37'S 28°12'E  
 Bône, Algeria 36°55'N 7°55'E  
 Bongozi (also Bongosi), Omo River, Ethiopia 5°23'N 36°07'E  
 Bontebok Nat. Pk., Swellendam Distr., Western Cape 34°04'S 20°27'E  
 Bonza Bay, Eastern Cape 32°58'S 27°57'E  
 Bopoto, Upper Congo – not traced  
 Bosongoro, Uganda – not traced  
 Botha's Hill, KwaZulu-Natal 29°45'S 30°44'E  
 Bottelay Hills, Western Cape = Bottelaryberg 33°51'S 18°46'E  
 Bouhadma, ?Algeria – not traced  
 Bou Halma – not traced  
 Bou Izakarn, Morocco 29°10'N 9°45'W  
 Bouizkarn, Morocco see Bou Izakarn  
 Boukouni, Guinea 11°30'N 9°30'W  
 Bouma Reserve, Senegal 13°54'N 16°04'W  
 Bpili, Crete – not traced  
 Brackenfell, Western Cape 33°53'S 18°41'E  
 Brakfontein, Richtersveld, Northern Cape 28°56'S 17°05'E  
 Branddraai, Northern Province 24°38'S 30°37'E  
 Breitrivier, Western Cape 33°34'S 19°10'E  
 Brondesbury Park [Hotel], Inyangaland, Zimbabwe c.18°15'S 32°40'E  
 Bromley, Melrose Siding, Zimbabwe 18°06'S 31°22'E  
 Brondesbury Park [Hotel], Inyangaland, Zimbabwe – not traced  
 Bronkhorstspruit, Gauteng 25°35'S 28°40'E  
 Broussa, Turkey 40°15'N 27°04'E  
 Bubye Bridge, Chikwarakwara Dip, Zimbabwe 21°47'S 30°29'E  
 Bubye, Zimbabwe 21°40'S 30°30'E  
 Budongo Forest, Uganda 1°45'N 31°35'E  
 Buea, Gr. Kamerunberg, Cameroon 4°09'N 9°14'E  
 Bueni/Iringa, Tanzania 6°39'S 32°46'E  
 Buffalo Pass, Eastern Cape 33°05'S 27°49'E  
 Buffelspoort, Magaliesberg, North-West 25°48'S 27°29'E  
 Bugesera, Rwanda see Karuma  
 Bugoma Forest, Unyoro, Uganda 1°15'N 30°53'E  
 Buguberg (also Boegoerberg), Northern Cape 31°53'S 19°14'E  
 Buhwa Foothills, Belingwe, Zimbabwe 20°35'S 30°25'E  
 Bulawayo, Zimbabwe 20°10'S 28°35'E  
 Bullspoort, Namibia 24°08'S 16°24'E  
 Bulembu, Swaziland 25°57'S 31°07'E  
 Bulungu Mts., Swaziland 26°40'S 31°32'E  
 Bumbo Forest see Mbalo  
 Bumbuli, Tanzania 3°56'S 37°46'E  
 Bundibugyo, Bwamba, Uganda 0°42'N 30°04'E  
 Bunduki, Uluguru Mts., Uganda – not traced  
 Bunga Forest, Vumba Mts., Zimbabwe 19°10'S 32°45'E  
 Bura, Wa-Taita, Kenya – ambiguous  
 Buran, Somalia 10°13'N 48°47'E  
 Burmah Valley, Zimbabwe 19°07'S 32°50'E  
 Burman's Bush, KwaZulu-Natal – not traced  
 Busaco (also Bucaco), Angola 11°30'S 20°10'E

- Busamtere, Neu-Kamerun – not traced  
 Bushman Rock, Mpumalanga 25°13'S  
 31°04'E  
 Busi Farm see Chipinga, Zimbabwe  
 Busongoro (also Busongora), Uganda  
 0°05'N 30°00'E  
 Butare, Rwanda – not traced  
 Butterworth, Eastern Cape 32°20'S  
 28°09'E  
 Buzzard Mountain Retreat,  
 Soutpansberg, Northern Province  
 c.23°01'S 29°45'E  
 Bvumbwe Experimental Station, Malawi  
 15°56'S 35°04'E  
 Bwamba, Toro, Uganda 0°50'N 30°03'E  
 Bwamba Pass, Uganda 0°40'N 30°08'E  
 Cadiz, Spain 36°35'N 6°18'W  
 Calabar, Nigeria 4°57'N 8°19'E  
 Calgary Farm, Mazoe Distr., Zimbabwe  
 17°28'S 31°00'E  
 Calweha River, Angola – not traced  
 Cambridge, Transkei, Eastern Cape  
 32°58'S 27°53'E  
 Camper Down, KwaZulu-Natal 29°43'S  
 30°32'E  
 Camps Bay, Western Cape 33°57'S 18°23'E  
 Canhoca, Cuanza Norte Prov., Angola  
 0°9'15"S 14°41'E  
 Canzele, Cuanza Norte Prov., Angola  
 0°8'18"S 15°11'E  
 Cap d'Kirmig, Senegal – not traced  
 Cape Town, Western Cape 33°55'S 18°25'E  
 Cape Vidal, KwaZulu-Natal 28°08'S  
 32°33'E  
 Cap Vert, Senegal – not traced  
 Casamance, Senegal 12°45'N 15°30'W  
 Catambela River see Catumbela  
 Cathedral Peak, Drakensberg, KwaZulu-Natal  
 28°55'S 29°09'E  
 Cathkin Peak, KwaZulu-Natal 29°04'S  
 29°21'E  
 Cato Ridge, KwaZulu-Natal 29°44'S  
 30°35'E  
 Catumbela River, Lobito Bay, Angola  
 12°26'S 13°33'E  
 Cement Camp see Khurunxaraga  
 Ceres, Western Cape 33°22'S 19°19'E  
 Changalane, Moçambique 26°17'S  
 32°11'E  
 Chania River Camp, Kenya c.1°02'S  
 37°04'E  
 Chaos/Mkuze, KwaZulu-Natal 27°40'S  
 32°00'E  
 Chete Game Reserve, Zimbabwe 17°25'S  
 27°45'E  
 Chifumbi Cold Springs, Chete Game  
 Reserve, Zimbabwe ?= Chete 17°20'S  
 27°35'E  
 Chikwarakwara Base Camp, Zimbabwe  
 22°20'S 31°05'E  
 Chiluwo Hills, Moçambique c.19°20'S  
 34°17'E  
 Chimanimani Mts., Zimbabwe/  
 Moçambique c.19°40'S 33°02'E  
 Chingola, Zambia 12°30'S 27°45'E  
 Chingue, Angola – not traced  
 Chipeta (also Chipota) Village – see  
 Karanga  
 Chipinda Pools, Gona-re-Zhou, Zimbabwe  
 21°17'S 31°55'E  
 Chipinge (also Chipinga), Zimbabwe  
 20°10'S 32°35'E  
 Chirinda Forest, Zimbabwe 20°27'S  
 32°40'E  
 Chiromo, Malawi 16°33'S 35°08'E  
 Chirundu Bridge, Zambezi, Zimbabwe  
 16°03'S 28°52'E  
 Chitrapadzi, Limpopo River, Zimbabwe –  
 not traced  
 Chiwefwe, Zambia 13°35'S 29°22'E  
 Chobe Rapids, Botswana see Kasane  
 Christiana, North-West 27°56'S 25°09'E  
 Christon Bank, Zimbabwe 17°36'S  
 31°00'E  
 Chulwe (also Chulwa, Shulwa), Tanzania  
 4°55'S 38°46'E  
 Chuniespoort, Northern Province 24°12'S  
 29°31'E  
 Citrusdal, Western Cape 32°35'S 19°01'E  
 Clairwood, KwaZulu-Natal 29°55'S  
 30°58'E  
 Clanwilliam, Western Cape 32°10'S  
 19°00'E  
 Clausthal, KwaZulu-Natal 30°14'S 30°47'E  
 Claver, Western Cape (= Klawer) 31°47'S  
 18°37'E  
 Cloud's End, Soutpansberg, Northern  
 Province 23°00'S 29°57'E  
 Clovelly, Western Cape 34°26'S 18°08'E  
 Coega, Eastern Cape 33°46'S 25°40'E  
 Coerny, Eastern Cape 33°27'S 25°44'E  
 Col de Kerdous, Antiatlas, Morocco  
 c.30°00'N 8°30'W  
 Col de l'Iremo, C. Madagascar 20°33'S  
 46°30'E  
 Coldstream, Eastern Cape 33°58'S 23°43'E  
 Col du Bekaka, Madagascar Sambirano –  
 10 km from Ambanja on Haut  
 Sambirano road  
 Colenso, KwaZulu-Natal 28°44'S 29°49'E  
 Colesberg, Northern Cape 30°43'S 25°04'E  
 Colleen Bawn, Zimbabwe 21°00'S 29°12'E  
 Comao Island, Comoro Islands – not  
 traced (= Comoro Island?)  
 Commadagga, Eastern Cape 32°38'S  
 25°55'E  
 Constantia, Cape – ambiguous  
 Constantiaberg, Western Cape 34°03'S  
 18°23'E  
 Coomassie, Ghana see Kumasi  
 Courland's Kloof, Eastern Cape ?=  
 Courtlands 33°41'N 25°41'E  
 Cradock, Cape – ambiguous; probably  
 32°10'S 25°40'E  
 Crescent Island, Lake Naivasha, Kenya  
 0°46'S 36°24'E  
 Crocodile Bridge, Mpumalanga 25°21'S  
 31°54'E  
 Crocodile Camp, Botswana 19°59'S  
 23°26'E  
 Crocodile Poort, Mpumalanga 25°29'S  
 31°10'E  
 Crocodile River, Northern Province  
 24°12'S 26°53'E  
 Crosskopje, Mutare Distr., Zimbabwe  
 19°00'S 32°41'E  
 Cuaimbi, Luanda Distr., Angola – not  
 traced  
 Cubal River, Angola – ambiguous  
 Cullinan, Gauteng 25°40'S 28°31'E  
 Dakar, Senegal 14°40'N 17°26'W  
 Dalmatia Region, Yugoslavia 42°40'N  
 18°15'E–44°00'N 16°00'E  
 Dange Angola, Malanje Prov., Angola  
 0°8'26"S 16°34'E  
 Dan Maria, Nigeria see Kogin Kano  
 Dar-es-Salaam, Tanzania 5°15'S 38°50'E  
 Darling, Western Cape 33°23'S 18°23'E  
 Daroli [River], Arussi Galla, Ethiopia  
 c.7°00'N 42°00'E  
 Darwendale, Zimbabwe 17°40'N 30°33'E  
 Debré Zeit (also Debra Zebit), Choa,  
 Ethiopia 11°48'N 38°37'E  
 Deepwall, For. Res./Knysna, Western  
 Cape 33°56'S 23°10'E  
 Degama, Nigeria 4°46'N 6°48'E  
 De Hoek Forestry, Northern Province c.  
 23°30'N 30°10'E  
 De Hoek, Piketberg Distr., Western Cape  
 32°54'S 18°46'E  
 De Hoop [Nat. Res.], Bredasdorp Distr.,  
 Western Cape 34°26'S 20°27'E  
 Deka River, 5 m NE. Wankie, Zimbabwe  
 18°12'S 26°35'E  
 Delagoa Bay, Moçambique see Baía de  
 Maputo  
 Delawe Ranch, Matetsi, Zimbabwe  
 18°26'S 25°55'E  
 De Plaat Forestry see Tsitsikama  
 Derdepoort, Northern Province 24°37'S  
 26°17'E  
 Devuli (now Devure) River, Zimbabwe  
 22°10'S 30°03'E  
 De Wet, Western Cape 33°36'S 19°30'E  
 Dhala (also Dala), Yemen 13°41'N 44°45'E  
 Dichwe Forest, Zimbabwe 17°11'S 30°23'E  
 Diego Suarez, SE. Madagascar 12°18'S  
 49°15'E  
 Diepwalle Forest Reserve, Eastern Cape  
 see Deepwalls  
 Digne, France 44°05'N 6°15'E  
 Dire Daoua (also Diredawa, Direaoua,  
 Diredua), Ethiopia 9°35'N 41°52'E  
 District of the Great Craters, Tanzania –  
 not traced  
 Diyona Camp see Diyova Camp  
 Diyova Camp, Okavango, Namibia  
 c.18°05'S 21°22'E  
 Djadjou, Comoro Islands – not traced  
 Djebel Gafsa, Tunisia see Gafsa  
 Djebel Masanah, Yemen see Sanaa  
 Djem-Djem Forest, Ethiopia – not traced  
 Djerin, Syria – not traced  
 Djibouti, French Somaliland (now  
 Djibouti) 11°35'N 43°09'E  
 Djiren, Djimma (also Jima), Ethiopia  
 7°40'N 36°50'E  
 Djouggar Mts., Tunisia (now Faquirin,  
 Jakal) 36°13'N 9°58'E  
 Djouma-Dounga, Mohéli, Comoro Islands  
 c.12°20'S 44°00'E  
 Djutitsa, Cameroon 5°35'N 10°05'E  
 Dlalua Forest, Karen, Kenya c.1°20'S  
 36°42'E  
 D'Nyala Game Reserve, Northern  
 Province c.23°45'S 27°43'E  
 Doddieburn Ranch, Zimbabwe 21°27'S  
 29°23'E  
 Dodoma, Tanzania 10°38'S 35°49'E  
 Dohne, Eastern Cape 32°31'S 27°27'E

- Dombe Forest, Moçambique 19°58'S 33°24'E
- Dondo, Moçambique c.19°40'S 34°41'E
- Donkerhoek, Gauteng 25°48'S 28°24'E
- Donkerboek, Western Cape 31°52'S 22°30'E
- Donkerpoort, Nylstroom Distr., Northern Province 24°34'S 27°39'E
- Dorfu, Valle del, Ethiopia 15°26'N 38°58'E
- Dott's Drift, Cbisumbanje, Zimbabwe c.20°42'S 32°20'E
- Douglas, Northern Cape 29°04'S 23°46'E
- Drummund, KwaZulu-Natal 29°45'S 30°42'E
- Duineveld see Farm Duineveld
- Duiwelskloof, Northern Province 23°42'S 30°08'E
- Dukudu Forest, KwaZulu-Natal 28°24'S 32°30'E
- Duma, Cameroon – ambiguous
- Dunbrody, Eastern Cape 33°28'S 25°33'E
- Dungu, Upper Uelle District, Zaire 3°37'N 28°34'E
- Duraimia – not traced
- Durban, KwaZulu-Natal 29°52'S 31°00'E
- Du Toit's Kloof, Western Cape 33°43'S 19°10'E
- Dwesa Forest, Transkei, Eastern Cape 32°17'S 28°50'E
- Dzelanyama Forest, Malawi 14°08'S 34°08'E
- Eagle's Crag, Eastern Cape 33°24'S 26°04'E
- East London, Eastern Cape 33°02'S 27°55'E
- Ed Damir (also Ad Damir), Hudeiba, Sudan 17°35'N 33°58'E
- Edea, Cameroon 3°48'N 10°08'E
- Eden Park, KwaZulu-Natal see Umrentwini
- Efoetsy, S. Madagascar – not traced
- Eigezi, Uganda see Impenetrable Forest
- Eksteenfontein Valley, Richtersveld, Northern Cape 28°47'S 17°12'E
- El-Aïoun-du-Dra, Morocco c. 34°30'N 2°30'W
- El Aouedje, Algeria – not traced
- Elandshoeek, Northern Province 24°24'S 27°49'E
- Elang, Cameroon 4°28'N 11°29'E
- Eldoret, Kenya 0°31'N 35°17'E
- Elephants River, Blumfeldte Distr., Namibia c.25°28'S 19°25'E
- Elisabethville, Zaire 11°40'S 27°28'E
- El Jadida, Algeria c. 33°20'N 8°30'W
- El Kubar, Amiri Ctry., SW. Arabia – not traced
- Ellisras, Northern Province 23°40'S 27°45'E
- El-Otaya, Algeria 35°04'N 5°36'E
- Elsenburg, Western Cape 33°50'S 18°50'E
- Emangeni, Bulawayo District, Zimbabwe – not traced
- Embo, Kenya – not traced
- Embotyi Forest (also Mbotyi), Transkei, Eastern Cape 31°28'S 29°44'E
- Emjanyana [Mission], Transkei, Eastern Cape 31°48'S 28°09'E
- En Gedi, Israel 31°28'N 35°23'E
- Enneri Marmar, Tibesti, Chad 19°30'N 16°20'E
- Enot Zugim, Israel – not traced
- Entabeni Forest, Soutpansberg, Northern Province 22°59'S 30°16'E
- Entebbe, Uganda 0°04'N 32°28'E
- Epulan, Cameroonian = Efoulan 2°49'N 10°32'E
- Erasmus Reserve, Pilgrim's Rest Distr., Mpumalanga – not traced
- Escarpmont, C. Kenya 1°01'S 36°37'E
- Eshowe, KwaZulu-Natal 28°53'S 31°28'E
- Essaouira, Morocco 31°30'N 9°40'W
- Essexvale (now Esigodini), Zimbabwe 20°16'S 28°57'E
- Estcourt, KwaZulu-Natal 29°00'S 29°53'E
- Etosha Pan, Namibia c.18°40'S 16°30'E
- Everton, KwaZulu-Natal 29°48'S 30°50'E
- Ewonda, Cameroonian 4°10'N 9°16'E
- Ezulwini, Swaziland 26°24'S 31°10'E
- Fala, Bahrain – not traced
- Farankaraina For. Sta., E. Madagascar c.15°30'S 49°35'E
- Farm
- Abel 52, Parys Distr., Free State 26°54'S 27°37'E
  - Abugabis 90, Keetmanshoop Distr., Namibia 27°05'S 18°25'E
  - Cyprus/Ofcolaco, Letaba Distr., Northern Province – not traced
  - Deelkraal, Nylstroom Distr., Northern Province – ambiguous
  - De Hoop 203 JU, Nelspruit Distr., Mpumalanga 25°31'S 31°10'E
  - Deurdrift, Springbok Distr., Northern Cape 29°45'S 17°56'E
  - Djab, Reboboth Distr., Namibia 23°15'S 16°17'E
  - Donkerboek, Northern Province 24°50'S 30°16'E
  - Doringkraal 420, Cullinan Distr., Gauteng – not traced
  - Doornhoek, Northern Province 24°50'S 30°16'E
  - Duineveld, Mariental Distr., Namibia c.24°35'S 18°50'E
  - Eettenmoutb, Alldays Distr., Northern Province 22°45'S 29°15'E
  - Godvertrouw/Papiesvlei, Eastern Cape – not traced
  - Harmonie, Northern Province 24°11'S 30°36'E
  - Kairo 212, NW. Alldays, Northern Province 22°38'S 28°52'E
  - Kiepersol, Pretoria Distr., Gauteng 25°33'S 28°29'E
  - Lismore, Zastron Distr., Free State – not traced
  - Longridge/Plettenberg Bay, Western Cape – not traced
  - Mosdene, Naboomspruit Distr., Northern Province – not traced
  - Noacabib, Karasberge, Namibia 27°25'S 18°28'E
  - Oldrieve's, Northern Province 22°59'S 29°50'E
  - Otjisewa (also Otjisewa), Windhoek Distr., Namibia c.22°20'S 18°50'E
  - Portsmut 33, Windhoek Distr., Namibia 23°08'S 16°22'E
  - Pullen, Mpumalanga 25°34'S 31°13'E
  - Rocbdale 500, Soutpansberg Distr., Northern Province 22°52'S 29°38'E
  - Rocbdale 700, Transvaal – not traced
  - Rooidam, Northern Cape 32°14'S 18°26'E
  - Slypsteen, Hopetown District, Northern Cape c. 29°40'S 24°05'E
  - Valencia, Reboboth Distr. see Valencia 42
  - Valencia 42, Windhoek Distr., Namibia 23°10'S 16°25'E
  - Warmberg, Northern Province – see Cbuniespoort
  - Waterval, Northern Province see New Smitsdorp
  - Zaris, Namibia 24°58'S 16°22'E
  - Fazenda Conguli, Amhoim Distr., Angola 10°52'S 14°17'E
  - Fernando Po 3°30'N 8°43'E
  - Fifa, Saudi Arabia – not traced
  - Fianarantsoa, C. Madagascar – locality given as western slopes
  - Fish Hoek, Western Cape 34°08'S 18°26'E
  - Fito, SW. Angola – not traced
  - Florence (now Chitimba) Bay, Malawi 10°33'S 34°13'E
  - Florida Park, North-West 26°11'N 27°54'E
  - Fomboni, Mobéli, Comoro Islands c.12°20'W 44°00'E
  - Fort Ambobitately, Ankazobe, C. Madagascar c.18°20'S 47°10'E
  - Fort Beaufort, Eastern Cape 32°46'S 26°37'E
  - Fort Dauphin (now Faradofay), SE. Madagascar 25°01'S 47°00'E
  - Fort Hall, Kenya 0°43'S 37°09'E
  - Fort Portal, Uganda 0°40'N 30°17'E
  - Fort Quilenges, Huila Distr., Angola 14°04'S 14°05'E
  - Fort Victoria, Zimbabwe 20°10'S 30°48'E
  - Fouriesberg, Free State 28°37'S 28°13'E
  - Four River Camp, Botswana 19°03'S 23°10'E
  - Fourteen Falls, Tbika, Kenya 1°05'S 37°15'E
  - Fourteen Streams, Barberton Distr., Mpumalanga 25°47'S 31°08'E
  - Fovira, Unyoro, Uganda – not traced
  - Francistown, Botswana 21°11'S 27°32'E
  - Franzfontein, Namibia 20°13'S 15°01'E
  - Friapere Forest, Kumasi, Ghana – not traced
  - Furankunga (also Furancungo), Moçambique 14°54'S 33°57'E
  - Gabiro, Rwanda – not traced
  - Gaborone, Botswana 24°39'S 25°54'E
  - Gadau, Nigeria 11°50'N 10°10'E
  - Gadjji, Batouri Distr., Cameroon 4°29'N 14°03'E
  - Gafsa, Tunisia c. 34°35'N 8°45'E
  - Galana River, Kenya 3°09'S 40°08'E
  - Gambaga, Gold Coast (now Ghana) 10°40'N 0°25'W
  - Gamtoos River Moutb, Eastern Cape 33°58'S 25°03'E
  - Ganyonyo, Ivory Coast – not traced
  - Gardoba-Djira, Garre (also Garri).

- Ethiopia 7°32'N 34°24'E  
 Garoua (also Garoua), Cameroon 9°18'N  
 13°24'E  
 Gatooma (now Kadoma) Research Sta.,  
 Zimbabwe 18°20'S 29°53'E  
 Gazi Forest, Kenya 4°25'S 39°30'E  
 Gemsbok (also Khemsbok) Pan, Botswana  
 c.21°45'S 21°38'E  
 Genderu [Mts.], Cameroon 7°23'N 12°00'E  
 Ghaub Valley, Namibia 19°27'S 17°46'E  
 Gheni, Ukamba, Kenya – not traced  
 Ghor-el-Safieh, Israel 31°03'N 35°27'E  
 Gifberg near Vanrhynsdorp, Northern Cape  
 30°32'S 18°29'E  
 Gikuyu, Kenya c.4°00'S 39°25'E  
 Ginginhlovu (also Gingindlovu),  
 KwaZulu-Natal 29°01'S 31°35'E  
 Gishwati Forest, Nyamyumba, NW.  
 Rwanda – not traced  
 Gladdie Klipkop, Northern Province  
 24°09'S 29°29'E  
 Glenerness, Northern Province 23°02'S  
 29°00'E  
 Glenlivet, Zimbabwe 20°10'S 31°05'E  
 Gloster Game Farm, North-West 25°11'S  
 27°38'E  
 Go [River], Uelle District, Zaire 2°57'N  
 20°07'E  
 Gobabeb, Namibia 23°34'S 15°03'E  
 Gobabis, Namibia 22°27'S 18°58'E  
 Gochas, Namibia 24°52'S 18°50'E  
 Goesabos Forestry, Eastern Cape see  
 Tsitsikamma  
 Golden Gate Nat. Pk., Free State 28°33'S  
 28°28'E  
 Gomba, Tanzania 5°02'S 38°17'E  
 Gommier, Algier see Biskra  
 Gona-Re-Zhou, Zimbabwe 21°30'S  
 32°00'E  
 Gondokoro, White Nile, Uganda c.4°55'S  
 32°00'E  
 Gondola, Moçambique see Amatonga  
 Forest 19°05'S 33°39'E  
 Gorobube, Upper Web River, Ethiopia  
 c.4°13'N 42°02'E  
 Graaff-Reinet, Eastern Cape 32°15'S  
 24°33'E  
 Graaf Reinet, Northern Province 22°47'S  
 28°10'E  
 Grahamstown, Eastern Cape 33°19'S  
 26°32'E  
 Graskop, Northern Province 24°55'S  
 30°50'E  
 Grassfield, Nimba, Liberia – Nimba Mts =  
 c.7°40'N 8°30'W  
 Grass Ridge, Eastern Cape 33°42'S  
 25°36'E  
 Griffin Mine, Transvaal – not traced  
 Griquatown, Northern Cape 28°51'S  
 23°15'E  
 Groblersdal, Mpumalanga 25°17'S 29°38'E  
 Groenvlei, Northern Provine 24°15'S  
 27°02'E  
 Grootfontein, Middelburg Distr., Northern  
 Cape 31°15'S 24°12'E  
 Grootfontein, Namibia 25°01'S 16°45'S  
 Groot River Pass, Eastern Cape 33°57'S  
 23°34'E  
 Grootvaderbos, Heidelberg Distr., Western  
 Cape 34°02'S 20°47'E  
 Grootzwart Berg, Western Cape 33°13'S  
 18°13'E  
 Grünfelde, Otjosondou Distr., Namibia ?=  
 Grünfeld 22°30'S 20°08'E  
 Guelma, Algeria 36°25'N 7°20'E  
 Guelt-es-Stel, Algeria c. 35°10'N 3°02'E  
 Gwai Bridge, Zimbabwe 18°38'S  
 27°07'E  
 Gwaliweni, Ingwavuma Distr., KwaZulu-  
 Natal 27°23'S 32°03'E  
 Gwelo (now Gweru), Zimbabwe 19°27'S  
 29°50'E  
 Haenertsburg, Northern Province 23°56'S  
 29°57'E  
 Haga Haga, Eastern Cape 32°45'S 28°15'E  
 Haifa, Israel 32°49'N 35°00'E  
 Halaviana, E. Madagascar – 6 km NW.  
 Fanovana  
 Hammam-Meskoutine, Morocco 36°26'N  
 7°12'E  
 Hammam Righa, Algeria – not traced  
 Hanglip Forest, Northern Province  
 23°00'S 29°54'E  
 Hankey, Eastern Cape 33°50'S 24°53'E  
 Harare, Zimbabwe 17°50'S 31°02'E  
 Harcha, Morocco – not traced  
 Hardap Dam, Mariental Distr., Namibia  
 c.24°35'S 17°55'E  
 Hargeisa, Somalia 9°35'S 44°04'E  
 Harithi, Saudi Arabia 21°18'N 40°18'E  
 Harkerville, Knysna Western Cape 34°02'S  
 23°14'E  
 Harrar (also Harar), Ethiopia 9°19'N  
 42°09'E  
 Harrismith, Free State c.28°10'S 29°00'E  
 Hartebeespoortdam, Brits Distr., North-  
 West 25°45'S 27°51'E  
 Hathuta River, Meru, Tanzania – not traced  
 Haute Ikoly, Itremo Massive, C.  
 Madagascar c.20°30'S 46°30'E  
 Havelock Mine, Swaziland 25°57'S  
 31°08'E  
 Hectorspruit, Mpumalanga 25°26'S  
 31°41'E  
 Heidelberg, Gauteng 26°31'S 28°21'E  
 Hekpoort, North-West 25°53'S 27°37'E  
 Helderberg Nature Reserve/Somerset  
 West, Western Cape 34°02'S 18°53'E  
 Hennops River, North-West 25°50'S  
 27°58'E  
 Hermanus, Eastern Cape 32°06'S 27°10' E  
 H.F. Verwoerd Dam see Oranjerug, Free  
 State  
 H. Hallam Dam, Zimbabwe see Harare  
 Hillside Dam, Zimbabwe see Bulawayo  
 Hilton, Colesberg District, 30°55'S 25°34'E  
 Hilton Road, KwaZulu-Natal 29°33'S  
 30°18'E  
 Himo River, Kilimanjaro, Kenya c.3°20'N  
 37°40'E  
 Hlabeni Forest, Creighton District,  
 KwaZulu-Natal 29°58'S 29°44'E  
 Hluhluwe, KwaZulu-Natal 28°01'S 32°16'E  
 Hodieda, Arabia – not traced  
 Hoekbaai, Northern Cape 32°21'S 18°25'E  
 Hogsback, Eastern Cape 32°06'S 27°01'E  
 Hope Fountain, Zimbabwe 20°11'S  
 28°36'E  
 HosséRé Faourou, Ribao, Cameroon  
 09°43'N 13°56'E  
 HosséRé Marbao, Cameroon 09°31'N  
 13°25'E  
 Hôtel de l'Akagera, Rwanda – not traced  
 Hot Springs, Zimbabwe 19°20'S 32°40'E  
 Hottentots Huisie, Western Cape 33°59'S  
 18°20'E  
 Houtbaai, Western Cape 34°02'S 18°21'E  
 Howick, KwaZulu-Natal 29°28'S 30°14'E  
 Hubert Young Drive, Kopje View,  
 Zimbabwe – not traced  
 Huilla (also Huila), Angola 15°06'S  
 13°30'E  
 Humbe, Angola 16°50'S 14°50'E  
 Humewood, Eastern Cape 33°58'S 25°39'E  
 Huntersroad, Zimbabwe 19°50'S 29°50'E  
 Hunyani River, Zimbabwe 17°53'S 31°00'E  
 Huri, Nioka, Zaire – ambiguous  
 Husab, Swakop River, Namibia 22°44'S  
 15°04'E  
 Hussein Dey, Algeria c. 36°45'N 3°05'E  
 Hutchinson, Northern Cape 31°30'S  
 23°11'E  
 Huwi Private Game Reserve, Ellisras  
 Distr., Northen Province 23°45'S  
 27°42'E  
 Ibadan, Nigeria – ambiguous  
 Ibo [Island], Moçambique 12°20'S 40°18'E  
 Idutywa, Eastern Cape 32°06'S 28°18'E  
 Ifaty, S. Madagascar – 25 km N. of Tulear  
 Ifrane, Morocco c. 33°35'N 5°10'W  
 Ifotaka, S. Madagascar – Amboasary Sud  
 underprefecture, 49 km N. of  
 Ambovombe  
 Ihosy, W. Madagascar 22°25'S 46°10'E  
 Ikelenge, Zambia see Mwinilunga 11°14'S  
 24°16'E  
 Ikom, Nigeria 5°58'N 8°42'E  
 Ikoma (also Ft. Ikoma), Tanzania 3°03'S  
 33°07'E  
 Ikonda, Kipengere Range, Tanzania 3°42'S  
 33°45'E  
 Ilala, Maramas Distr., N. Kavirondo,  
 Kenya – not traced  
 Ilbisil, Kenya 2°06'S 36°47'E  
 Ille-aux-Prunes, Tamatave, E. Madagascar  
 c.18°10'S 49°30'E  
 Ilesha, Nigeria 7°37'N 4°44'E  
 Ilha da Inhaca, Moçambique 26°00'S  
 32°55'E  
 Illovo Beach, KwaZulu-Natal 30°07'S  
 30°51'E  
 Illovo River, KwaZulu-Natal 30°06'S  
 30°51'E  
 Ilonga, Morogoro Distr., Tanzania 9°04'S  
 36°51'E  
 Imbazwane, KwaZulu-Natal see  
 M'Bazwaan  
 Imerina province, C. Madagascar  
 c.18°20'S 46°15'E – 19°30'S 48°00'E  
 Imgwe (also Ingwe)[Motel],  
 Soutpansberg, Northern Province  
 22°58'S 29°56'E  
 Impenetrable Forest, Kigezi, Uganda  
 1°00'S 29°40'E  
 Impetyeni Forest, KwaZulu-Natal 30°39'S  
 29°38'E  
 Inanda Mts., KwaZulu-Natal c.29°45'S  
 31°05'E  
 Inchanga, KwaZulu-Natal 29°45'S  
 30°40'E

- Inesgane (also Inezgane), Morocco c.30°33'N 9°23'W
- Ingwawuma, KwaZulu-Natal 27°08'S 32°00'E
- Ingwesi [Farm], Syringa, Zimbabwe c.19°50'S 28°50'E
- Insiza (now Nsiza), Zimbabwe 19°44'S 29°12'E
- Inyack Isl., Moçambique see Ilha da Inhaca
- Inyalazi (also Nyalazi) River, KwaZulu-Natal 28°05'S 32°22'E
- Inyangas Mts., Zimbabwe 18°13'S 32°42'E
- Irene, Gauteng 25°53'S 28°13'E
- Iringa, Tanzania 7°45'S 35°42'E
- Isaka Forest, E.Madagascar – 30–35 km NW. of Fort Dauphin
- Isasha (also Ishasha) Gorge, Uganda 0°28'S 29°39'E
- Isbasha River Camp, QE Park, Uganda c.0°15'S 30°00'E
- Isiolo, Kenya 1°00'N 38°45'E
- Itampolo, S. Madagascar 24°33'S 43°56'E
- Itremo Massive, C. Madagascar see Col de l'Itremo
- Ixopo, KwaZulu-Natal 30°09'S 30°05'E
- Jala River, Kakamega, Kenya c.0°08'N 34°55'E
- Janjoki, Unyoro, Uganda – not traced
- Jaunde Station, Cameroon see Yaoundé
- Jemaa, Nigeria 9°28'N 8°23'E
- Jidda, Saudi Arabia 21°32'N 39°10'E
- Johann-Albrechts-Höhe, Cameroon (now Kumba) 4°38'N 92°5'E
- Johannesburg, Gauteng 26°12'S 28°05'E
- Jonkershoek, Western Cape 33°58'S 18°55'E
- Jozini Dam (also Josini), KwaZulu-Natal 27°30'S 32°05'E
- Juaso, Ashanti, Ghana 5°44'N 1°17'E or 6°35'N 1°07'E
- Jubdo Bir-Bir, Wallega Prov., Ethiopia 8°53'N 35°30'E
- J. van Noord, Namibia – not traced
- Kaapmuider, Komatiporto Distr., Mpumalanga 25°32'S 31°19'E
- Kabarutar, Ethiopia c.11°20'N 37°20'E
- Kabira Forest, Ruanda Distr., Tanzania – not traced
- Kahulabula, Chobe River, Botswana 17°50'S 24°58'E
- Kahwir, Bauchi Prov., Nigeria 9°24'N 9°34'E
- Kacheliba, Kenya 1°33'N 35°00'E
- Kadjadju, Lac Kivu region, Zaire – not traced
- Kaduna, Nigeria 10°31'N 7°26'E
- Kafakumba, Katanga Distr., Zaire 9°41'S 23°44'E
- Kagera River, Nsongezi, Uganda 0°57'S 31°47'E
- Kagera Sawmills, Masaka (also Masoka), Uganda 0°39'N 30°23'E
- Kaimosi (also Kaifiasi), Kenya 0°11'N 34°57'E
- Kajela (also Kajola), Nigeria 10°47'N 12°27'E
- Kakamega Forest, Kenya 0°16'N 34°53'E
- Kalambatitra Massive, C. Madagascar – 40 km SE. of Betroka
- Kalinzu Forest, Ankole, Uganda 0°25'S 30°05'E
- Kalk Bay, Western cape 34°08'N 18°27'E
- Kalkfontein, Namibia 19°30'S 18°13'E
- Kalkheuvel, North-West 25°31'S 27°53'E
- Kalkoenkrans, Carolina Distr., Mpumalanga 26°55'S 30°05'E
- Kamanjab, Outjo District, Namibia 19°38'S 14°45'E
- Kamasia [Hills], Kenya 0°30'N 35°48'E
- Kambove, Zaire c.10°50'S 24°00'E
- Kamengo, Mawakota, Uganda 0°40'S 31°28'E/0°13'N 31°28'E
- Kampala, Uganda 0°19'N 32°35'E
- Kampersrus, Northern Province 24°30'S 30°53'E
- Kang, Botswana 23°46'S 22°51'E
- Kano, S. Nigeria – ambiguous
- Kanye, Botswana 25°00'S 25°20'E
- Kaoko (also Gauko) Otavi, Kaokoveld, Namibia 18°18'S 13°42'E
- Kaoiack, Senegal 14°09'N 16°04'W
- Kapsabet, Kenya 0°12'N 35°06'E / 0°46'S 35°22'E
- Karakovisa (also Karakuwisa), Namibia 18°56'S 19°44'E
- Karama area, Rwanda c.2°15'S 30°16'E
- Karanga (also Karonga) Distr., Malawi 10°00'S 33°45'E
- Karasberge (also Karrasberg), Namibia 26°57'S 18°50'E
- Kariba, Zimbabwe 16°33'S 28°50'E
- Karidjhalu, Mane River, Ethiopia c.6°40'N 40°43'E
- Karkloof, KwaZulu-Natal 29°26'S 30°19'E
- Karo-Lola, Ethiopia – not traced
- Karura Forest, Nairobi, Kenya 1°14'S 36°50'E
- Kasane, Chobe Rapids, Botswana 20°00'S 26°00'E
- Kasokwa, Unyoro, Uganda 1°40'N 31°35'E
- Kasouga [River], Eastern Cape c.33°35'S 26°35'E
- Kastrol Nek, Mpumalanga 25°17'S 30°19'E
- Katagrukwa (also Katagrukwa) River, Uganda 1°38'N 31°49'E
- Katako-Kombe, Sankuru, Zaire 2°58'S 25°53'E
- Katambora, Zambia 17°55'S 25°24'E
- Katambora Rapids, Zambezi, Zimbabwe c.17°50'S 25°25'E
- Katana, W. Kivu, Zaire 2°13'S 28°50'E or 5°39'S 18°18'E
- Katanga Distr., Zaire 10°00'S 27°30'E
- Katera Sango Bay, Masaka, Uganda ?= Katera 0°55'S 31°40'E see also Masaka
- Kathita River, Meru, Tanzania c.0°09'S 31°40'E
- Katima Mulilo (also Molilo), Namibia 17°30'S 24°16'E
- Katse, Lesotho 29°07'S 28°32'E
- Kaurivo, Kitui, Kenya – not traced
- Kavani-M'sapéré, Mayotte, Comoro Islands c.12°35'S 45°40'E
- Kayonza, Kigezi, Uganda c.0°50'S 31°00'E
- Kayove, Rwanda see Gishwati Forest
- Kazuma Forest, Kazuma Pan Nat.Pk., Zimbabwe c.18°26'S 25°30'E
- Kedai, Kenya 3°16'S 38°21'E
- Keetmanshoop, Namibia 26°34'S 18°08'E
- Kei Bridge, Eastern Cape 32°31'S 27°58'E
- Kei Cuttings, Eastern Cape 32°35'S 23°25'E
- Kela Village, Cameroons 3°51'N 11°21'E
- Kenhardt, Northern Cape 29°21'S 21°09'E
- Ketchiba, Aroussi, Ethiopia c.7°10'N 40°00'E
- Kete, Gold Coast see Kete Krachi, Ghana
- Kete Krachi, Ghana 7°50'N 0°05'W
- Khami, Zimbabwe 20°18'S 28°27'E
- Kharixas, Welwitschia, Namibia c.22°35'S 15°00'E
- Khartum, Sudan 15°36'N 32°32'E
- Khuis op Malopo, Northern Cape-Botswana border 26°40'S 21°50'E
- Kibale Forest, Toro, Uganda 0°30'N 30°25'E
- Kibara, Zaire ?= Kibata 5°57'S 25°39'E
- Kihuni, Machakos-Neugia, Kenya c.1°30'S 37°39'E
- Kiboko River, Kenya 2°09'N 37°54'E
- Kibwezi [Forest], Kenya 2°26'S 37°55'E
- Kigoma Distr., Tanzania 5°30'S 30°00'E
- Kigonsera, Tanzania 10°48'S 35°05'E
- Kikuyu, Machakos-Neugia, Kenya see Gikuyu
- Kikwero, Unyoro, Uganda – not traced
- Kiliifi, Kenya 3°38'S 39°51'E
- Kilimanjaro, Kenya 3°24'S 39°57'E
- Kima, Kenya 1°57'S 37°15'E
- Kimberley, Northern Cape 28°45'S 24°46'E
- King Williamstown, Eastern Cape 32°53'S 27°24'E
- Kirbehs, Kenya – not traced
- Kirkwood, Eastern Cape 33°24'S 25°26'E
- Kirstenbosch, Western Cape 33°59'S 18°26'E
- Kisii Distr., S. Kavirondo, Kenya 0°45'S 34°50'E
- Kitale, Kenya 1°29'S 31°17'E
- Kitega, Burundi 3°26'S 29°56'E
- Kitombo, Lac Kivu Distr., Zaire – not traced
- Kitobo Forest, Taveta, Kenya c.3°25'S 37°42'E
- Kitwe Distr., Zambia 12°50'S 28°15'E
- Klaver, Western Cape 31°46'S 18°37'E
- Kleine Monde, Bathurst Distr., Eastern Cape 33°31'S 26°55'E
- Klein Klipheuvel, Western Cape ?= Klipheuvel 33°42'S 18°41'E
- Kleinmond, Western Cape 34°21'S 19°02'E
- Klein Sand River Valley, Northern Province 24°25'S 28°06'E
- Klipfontein, Mpumalanga 25°55'S 29°13'E
- Kliphuysvlei, Swartbergpas, Western Cape c.33°20'S 22°00'E
- Klipplaat, Cape – ambiguous
- Kloof, KwaZulu-Natal 29°47'S 30°50'E
- Knysna, Western Cape 34°02'S 23°02'E
- Kogelberg Nat. Res., Western Cape 34°14'S 18°52'E
- Kogin Kano Game Reserve, Nigeria 11°50'N 8°31'E
- Kolomo – not traced
- Kolwezi, Katanga Prov., Zaire 10°43'S 25°28'E
- Komatipoort, Mpumalanga 25°26'S 31°57'E

- Komati River, Swaziland 25°46'S 32°43'E  
 Kombamune, Moçambique – not traced  
 Kongolia, Suk, Kenya ?= Kongoli 0°35'N 34°39'E  
 Kongwa, Tanzania 6°12'S 36°25'E  
 Koofontein (now Steinkopf), Northern Cape 29°13'S 17°40'E  
 Korogwe, Tanzania 5°09'S 38°29'E  
 Kosi Lake, KwaZulu-Natal 26°58'S 32°50'E  
 Koster, Northern province 25°52'S 26°54'E  
 Kotzesrus, Northern Cape 30°56'S 17°49'E  
 Koulouba, French Sudan – not traced  
 Kounden Plateau, Cameroon c.5°40'N 10°40'E  
 Kowares (also Ojtokavare), Namibia 19°04'S 14°22'E  
 Kowie River, Eastern Cape 33°36'S 26°54'E  
 Kwyn's Pass, Mpumalanga 24°57'S 30°52'E  
 Krachi, Gold Coast see Kete Krachi, Ghana  
 Kraanspoort, Transvaal – not traced  
 Krugersdorp, Gauteng 26°06'S 27°46'E  
 Kubusie Forest, Stutterheim Distr., Eastern Cape 32°27'S 27°53'E  
 Kuchawe Inn, Malawi see Zomba Plateau  
 Kuchelebai, Kenya 1°29'N 35°01'E  
 Kuiseb River, Namibia 23°00'S 14°33'E  
 Kuke Pan, Botswana 23°19'S 24°27'E  
 Kulau, NE. Madagascar – not traced  
 Kuleni (also Kuleni) [Hill], KwaZulu-Natal 27°55'S 32°22'E  
 Kumasi, Gold Coast (now Ghana) 6°41'N 1°37'W  
 Kumbo, Nigeria (earlier Kamerun) 6°15'N 10°42'E  
 Kurasini, Dar-es-Salaam Distr., Tanzania 6°51'S 39°17'E  
 Kuringkuru, Namibia 17°36'S 18°38'E  
 Kuruman, Northern Cape 27°27'S 23°26'E  
 Khurunxaraga, Okavango, Botswana 19°38'S 23°09'E  
 Kut-al-Amara, Iraq 32°47'N 45°46'E  
 Kuya Valley, S. Kavirondo, Kenya c.0°52'S 34°18'E  
 Kwaai, Botswana ?= Khwai River or Khwai (River) Lodge 19°09'S 23°50'E  
 Kwadoso (also Kwadiso), Ghana 6°42'N 1°39'W  
 Kyagive, Malange see Mabira Forest  
 Lac Tsimanampetsotsa, S. Madagascar 24°07'S 43°48'E  
 Ladysmith, KwaZulu-Natal 28°33'S 29°47'E  
 Laersdrif, Middelburg Distr., Mpumalanga 25°19'S 29°50'E  
 Lake Bangweolo (also Bangweulu), Zambia c.4°10'S 29°40'E  
 Lake Baringo, Kenya 0°38'N 36°05'E  
 Lake Chila/Abercorn, Zambia 8°50'S 31°23'E  
 Lake Chilwa, Malawi 15°12'S 35°50'E  
 Lake George, Uganda 0°00' 30°12'E  
 Lake Kyoga, Teso Distr., Uganda 1°30'N 33°00'E  
 Lake Manyara, Tanzania 3°35'S 35°50'E  
 Lake McIlwaine, Zimbabwe 17°53'S 30°48'E  
 Lake Mentz, Eastern Cape 33°13'S 25°09'E  
 Lake Naivasha, Kenya 0°46'S 36°21'E  
 Lake Natron, Tanzania see Loliondo  
 Lake Ndutu, Ngorongoro, Tanzania 3°11'N 35°32'E  
 Lake Nyasa, Malawi 12°00'S 34°30'E  
 Lake Rukwa, Tanzania 8°00'S 32°25'E  
 Lake Sereri, Tanzania 3°53'S 35°52'E  
 Lake Tana, Ethiopia 12°00'N 37°20'E  
 Lake Ukerewe, Tanzania c.2°00'S 33°00'E  
 Lakita Bay see Lobito Bay  
 Lalapanzi, Northern Province c.23°20'S 29°50'E  
 Lalla Marnia, Algeria see Marnia  
 La Mandraka, C. Madagascar – Manjakandriana underprefecture  
 Lambese (also Lambez), Algeria 35°26'N 6°23'E  
 Lambomakandro Forest, W. Madagascar – NE. of Sakaraha, old Tulear road at km 80  
 Lambwe Valley, Nyanza, Kenya 0°40'S 34°17'E  
 Lamto, Ivory Coast – not traced  
 Langata/Nairobi, Kenya – ambiguous  
 Langeni Forest, Transkei, Eastern Cape 31°29'S 28°28'E  
 Langjan Nature Reserve, Northern Province 22°52'S 29°14'E  
 Langklip, Gordonia Distr., Northern Cape 28°13'S 20°21'E  
 Langverwacht (Farm?), Vryheid Distr., KwaZulu-Natal – not traced  
 Lapalala, Northern Province 23°51'S 28°17'E  
 La Redoute see Algier  
 Largido, Tanzania – not traced  
 Laurenceville, Vumba Mts., Zimbabwe 19°05'S 32°48'E  
 Lebombo Mts., KwaZulu-Natal/Swaziland 26°15'S 32°00'E  
 Leipoldtville, Western Cape 32°13'S 18°29'E  
 Lekkerwater, Pietersburg Distr., Northern Province 23°23'S 29°56'E  
 Lemana, [Institution? Tzaneen Northern Province 23°30'  
 Les Roussettes, Montagne d'Ambre, N. Madagascar 12°33'S 49°03'E  
 Letaba Northern Province 23°52'S 30°16'E  
 Libertas, Northern Cape 29°21'S 22°24'E  
 Lilongwe, Malawi 14°00'S 33°35'E  
 Limba, Liberia see Grassfield  
 Limburg, Northern Province 23°48'S 28°54'E  
 Limuru, Kenya 1°06'S 36°39'E  
 Lindi Distr., Tanzania 10°00'S 39°20'E  
 Little Switzerland/Bergville, KwaZulu-Natal c.28°45'S 29°10'E  
 Livingstone Distr., Zambia 17°40'S 26°00'E  
 Livingstone Mountains, Tanzania 9°45'S 34°20'E  
 Loangwa Distr., Zambia c.10°45'S 32°40'E  
 Loangwa (also Luangwa) River, Zambia 15°36'S 30°25'E  
 Lobatsi, Botswana 25°13'S 25°40'E  
 Lobito Bay, Catumbela River, Angola 12°21'S 13°33'E  
 Lokobé Forest, Madagascar Sambiranò, Nossi Bé c.13°50'S 48°10'E  
 Loliondo, Tanzania 2°02'S 35°39'E  
 Lolodorf, Cameroon 3°16'N 10°48'E  
 Lomagundi area, Zimbabwe c.17°20'S 30°20'E  
 Lomié, Cameroon 3°10'N 13°37'E  
 Longa River, Angola 14°40'S 18°30'E  
 Loucoubé, Madagascar see Lokobé  
 Louis Trichardt, Northern Province 23°02'S 29°54'E  
 Lourenco Marques, Moçambique see Maputo  
 Louw's Creek, Komatiport Mpumalanga 25°38'S 31°18'E  
 Lowa, Zaire – ambiguous  
 Lowdale, Zimbabwe 17°40'S 31°02'E  
 Lowdrift/Mkuze, KwaZulu-Natal – not traced  
 Lower Chambezi, Malawi ?= Chambidzi 13°24'S 33°46'E  
 Lower Imenti Forest, Kenya – not traced  
 Lower Sabie, Mpumalanga 25°07'S 31°55'E  
 Lowowo Valley, S. Lowa Distr., W. Kivu – not traced  
 Luangu (also Luango) River, Zambia 14°39'S 22°23'E  
 Lubudi, Zaire – ambiguous  
 Luchenya (also Luchenza) River, Malawi 16°00'S 35°18'E  
 Luitpold Mts., Idutha, Kenya 02°50'S 37°40'E  
 Lujeri Tea Estates, Malawi 16°00'S 35°39'E  
 Lukinga, Athi River, Kenya – not traced  
 Lulua, Katanga Prov., Zaire 10°37'S 24°54'E  
 Lumbwa, Kenya 0°12'S 35°28'E  
 Lundi (now Runde) River, Zimbabwe 20°55'S 30°48'E  
 Lunga River, Zimbabwe 20°25'S 28°47'E  
 Lusaka, Zambia 15°25'S 28°20'E  
 Lushoto Distr., Tanzania 4°40'S 38°20'E  
 Lutope Tin Mine, Zambezi Valley, Moçambique – not traced  
 Luwumbu Valley, Zambia c.11°10'S 32°50'E  
 Lydenburg, Mpumalanga 25°06'S 30°27'E  
 Mababe Flats, Botswana c.18°50'S 24°15'E  
 Mabalingwe, Northern Province 24°50'S 28°04'E  
 Mababe Flats, Botswana see Mababe  
 Mabira Forest, Jinja, Uganda 0°30'N 32°55'E  
 Mabula Lodge W. Nylstroom, Northern Province – not traced  
 Macenta, Guinea c.8°40'N 9°25'W  
 Machakos, Kenya 2°00'S 37°40'E  
 Macheke, Zimbabwe 18°07'S 31°50'E  
 Madibira, Tanzania 8°12'S 34°49'E  
 Madi Opei, Uganda 3°44'N 33°06'E  
 Madziwa Mine, Zimbabwe – not traced  
 Mafa, Botswana – not traced (= Nata?)  
 Mafuga Forest, Kigezi, Uganda 1°03'S 29°52'E  
 Magaliesberg, Pretoria Distr., Gauteng 25°53'S 28°36'E  
 Magamba Forest, Usambara, Tanzania 4°42'S 38°18'E

- Magude (also Magudu), Moçambique  
25°02'S 32°39'E
- Magunda Estate, Malawi see Luchenya River
- Mahafaly Plateau, S. Madagascar c.24°30'S 44°15'E
- Mahalapye, Botswana 23°04'S 26°50'E
- Mahanoro, E. Madagascar 19°48'S 48°45'E
- Mahidh, Saudi Arabia – not traced
- Mahoma River, Ruwenzori, Uganda 0°28'N 30°16'E
- Mahuba's Kloof (Magoehaskloof), Northern Province 23°50'S 30°10'E
- Makabete, Machakos, Kenya sec Makareti
- Makala-ma-Bedi, Bottele River, Botswana 20°20'S 23°49'E
- Makareti, Kenya 1°34'S 37°19'E
- Makatringo, Madagascar ?= Mahatsinjo, C., Maeavatanana underprefecture, 19 km SE, of Andriba
- Makindi (also Makindu), Nairobi Distr., Kenya 0°58'S 37°06'E
- Makulane, Moçambique 21°27'S 33°12'E
- Malaba Forest, Kenya – not traced
- Malabigambo Forest, Sango Bay, Uganda see Katera
- Malagwane Hill, Swaziland see Mbahane
- Malati Park, Tzaneen Distr., Northern Province 23°52'S 30°47'E
- Malelane, Mpumalanga 25°29'S 31°31'E
- Malili, Kenya – not traced
- Malmesbury, Western Cape 33°29'S 18°45'
- Malo, Kenya – not traced
- Malolotja (also Malolotsha), Swaziland 27°01'S 31°39'E
- Malta, Pietersburg Distr., Northern Province 24°09'S 30°13'E
- Malta Forest, Pietersburg Dist., Northern Province c.24°12'S 30°22'E
- Manathies, Lesotho 29°08'S 27°51'E
- Mannoah, Lesotho – 29°09'S 28°29'E
- Mamre, Western Cape 33°31'S 18°28'E
- Manamby (also erroneously Manomby) Forest, W. Madagascar c.20°18'S 44°45'E
- Mananjarie (also erroneously Mananjara), E. Madagascar 21°11'S 48°18'E
- Manchice, Portugal – not traced
- Manda Island, Tanzania 7°25'S 30°34'E
- Mandera, Somalia 9°52'N 4°43'E
- Manengouba Massive, Cameroon 5°00'N 9°50'E
- Mango, Lk. Nyassa, Tanzania 11°14'S 34°44'E
- Manjakatombo, C. Madagascar see Ankaratra Massive
- Manjaro (also Manjaro) Hotel, Tanzania 5°25'S 34°54'E
- Manjarivo, C. Madagascar – Andrianony Chain, Andringitra Massive
- Manongarivo Massive, Madagascar Sambirano – 50 km S. of Ambanjan on national road 6 from Diego Suarez
- Maphelana (also Maphalana, Mapalana), KwaZulu-Natal 28°25'S 32°26'E
- Maput (also Maputa), KwaZulu-Natal 26°59'S 32°45'E
- Maputo, Moçambique 25°58'S 32°34'E
- Maraheki, Thabazimbi Distr., Northern Province 24°34'S 27°36'E
- Maralal, Kenya 2°54'S 37°39'E
- Marandellas (now Marondera), Zimbabwe 18°10'S 31°32'E
- Marangu, Tanzania 3°17'S 37°31'E
- Marble Hall, Mpumalanga 24°58'S 29°18'E
- Mariepskop (also Marieps Mtn.), Northern Province 24°35'S 30°50'E
- Marigat, Kenya 0°28'N 35°59'E
- Maringo, Kenya – not traced
- Mariti (also Marite) Forest, Northern Province 24°57'S 30°52'E
- Maritzburg, KwaZulu-Natal – see Pietermaritzburg
- Marnia, Algeria c.34°45'N 1°45'W
- Maroantsetra (formerly Port-Choiseul), E. Madagascar 15°26'S 49°40'E
- Marofandilia Forest, W. Madagascar – at km 28.5 on Morondava-Belo road
- Maronga Forest, Moçambique 20°03'S 33°09'E
- Marowe River, Zimbabwe see Brondesbury Park
- Marungu (also Marangu), Kilimanjaro, Tanzania 3°44'S 30°48'E
- Marsille, France 43°18'N 5°20'E
- Masaka, Uganda 0°57'S 31°42'E
- Masan River, Tanzania ?= Masanwa River 3°26'S 33°46'E
- Mashare, Namibia, c.17°54'S 20°09'E
- Masindi, Uganda 1°41'N 31°43'E
- Masoka, Chiware Safari area, Zimbabwe c.16°10'S 29°50'E
- Masongoleni (also Masongaleni), Kenya 2°22'S 38°12'E
- Massadou/Maccinta, Guinea c.8°25'N 9°22'W
- Massai Steppe, Tanzania 4°45'S 37°00'E
- Massangena Distr., Save River, Moçambique 21°32'S 32°57'E
- Matadi, Zaire – 5°44'S 13°26'E
- Mata Mata, S. Kalahari, Northern Cape 25°49'S 20°01'E
- Matabeleland, Zimbabwe c.19°40'S 28°40'E
- Matetsi, Zimbabwe 18°20'S 25°55'E
- Matjesfontein, Western Cape 33°13'S 20°35'E
- Matjulwana, Komatiopoort Mpumalanga 25°31°
- Ga-Matlala: ?= Matlala Location, Northern Province c.23°37'S 28°50'E
- Matopos Research Station, Zimbabwe c.20°30'S 28°42'E
- Matsheamhlope, Zimbabwe see Bulawayo
- Mau, Uganda erratum? Mau area, Kenya c.0°45'S 35°42'E
- Maun, Botswana 19°59'S 23°25'E
- Mavuradonha Wilderness Area, Zimbabwe c.16°10'S 31°10'E
- Mawanga Forest, Songea, Tanzania c.10°40'S 35°40'E
- Mazabuka Distr., Zambia 16°00'S 28°00'E
- Mazagan, Algeria see El Jadida
- Mazeze, Zaire 9°37'S 23°40'E
- Mazoe, Zimbabwe see Mazowe
- Mazowe, Zimbabwe 17°30'S 30°59'E
- Mazvikadei Dam/Banket, Zimbabwe 17°10'S 30°33'E
- Mbabane, Swaziland 26°20'S 31°08'E
- Mbala (also Mbale), Zambia 8°50'S 31°22'E
- Mbale Territory, Uganda 1°10'E 05°N 34°
- M'Balmayo, Cameroon 3°31'N 11°30'E
- Mbalo, Bumbo Forest, Uganda 0°08'N 32°08'E/0°51'N 34°23'E
- M'Bazwaan (also Mbazwana) Forest, KwaZulu-Natal 27°29'S 32°35'E
- Mbeya Region, Tanzania 8°30'S 32°00'E
- Mbolo (also Mbole) Hill, Voi Distr., Kenya 2°11'S 38°24'E
- Mbona, KwaZulu-Natal 30°18'S 30°22'E
- Mbula, Transkei, Eastern Cape c.31°49'S 27°35'E
- Mecca, Saudi Arabia 21°27'N 39°48'E
- Meikle's Jungle, Zimbabwe 18°59'S 32°39'E
- Melkboschstrand, Western Cape 33°44'S 18°26'E
- Melmoth, KwaZulu-Natal 28°35'S 31°24'E
- Melsetter, Zimbabwe 19°48'S 32°52'E
- Meretanana, Madagascar – not traced
- Mersa Fatma, Eritrea, Ethiopia 14°55'S 40°20'E
- Meru, Tanzania see Mount Meru
- Messer, Algeria – not traced
- Messina, Northern Province 22°21'S 30°03'E
- Mfongosi, KwaZulu-Natal 28°42'S 30°48'E
- Mgana (also Mgama), Kenya 3°33'S 38°18'E
- M'gazi (also Mgasi), Kombamune, Moçambique 23°12'S 32°54'E
- Mhlosinga, Hlabisa Distr., KwaZulu-Natal 27°53'S 32°12'E
- Mhonda, Tanzania 6°07'S 37°34'E
- Miary, S. Madagascar – calcareous plateau in Tulear region
- Middelburg, Eastern Cape 31°30'S 25°02'E
- Middelburg, Mpumalanga 25°47'S 29°25'E
- Migwani, Kitui, Kenya 1°06'S 38°01'E
- Mihumo, Kigoma, Tanzania 9°45'S 38°05'E
- Mikea Forest, S. Madagascar – 100 km N. of Tulear on Ampasikibo-Salary road
- Mikinguri (also Mikunguni), Tanzania 5°32'S 38°56'E
- Mikindani, Tanzania 10°17'S 40°07'E
- Mikumi, Morogoro Distr., Tanzania 7°24'S 36°59'E
- Miller's Falls, Swaziland 26°23'S 31°10'E
- Minastune, Northern Province see Louis Trichardt
- Mirambo, Zambia 11°28'S 29°10'E
- Miringoni, Mohéli, Comoro Islands c.12°20'S 44°00'E
- Misahöhe, Togo 6°57'N 0°35'E
- Mitchell's Pass, Eastern Cape 32°33'S 26°53'E
- Mkambati, Transkei, Eastern Cape 31°17'S 29°57'E
- Mkatta (also Mkata), Tanzania – ambiguous
- Mkuwadzi Forest, Nkata Bay, Malawi 11°41'S 34°15'E
- Mkuze (also Mkuzi), KwaZulu-Natal 27°39'S 32°14'E

- Mlahlane, Transkei, Eastern Cape 30°20'S 29°33'E
- Mlanji (also Mlanje) Boma, Malawi 16°02'S 35°30'E
- Mmabolela Estate, Northern Province 22°40'S 28°15'E
- Moa, Tanzania 4°46'S 39°10'E
- Moab Mts., Israel c.31°18'N 35°42'E
- Moamba, Maputo Distr., Moçambique 25°36'S 32°15'E
- Moboroni, Nandi Distr., Tanzania – not traced
- Mobuku Valley, Ruwenzori, Uganda 0°11'N 30°14'E
- Modderfontein, Gauteng 26°39'S 28°23'E
- Modra, Tibesti, Chad 20°34'N 17°45'E
- Mogadiscio, Somalia 20°04'N 45°22'E
- Mogador (now Essaouira), Morocco 36°23'N 9°40'W
- Moheombo, W. Ngamiland, Botswana 18°15'S 21°47'E
- Mokwa, Nigeria 9°17'N 5°03'E
- Molo, Kenya 0°15'S 35°44'E
- Molo River, Kenya 0°09'S 35°53'E
- Mombio, Tanzania 4°53'S 38°17'E
- Momella, Mt. Meru, Tanzania = Lake Momela? 3°13'S 36°54'E
- Mongalla Province, Sudan 5°10'N 31°46'E
- Monkey Bay, Malawi 14°03'S 34°55'E
- Montagu, Western Cape 33°47'S 20°07'E
- Mont-aux-Sources [area], Drakensberg, KwaZulu-Natal 29°30'S 28°52'E
- Monzambi, Zaire 0°17'N 18°30'E
- Monzi, KwaZulu-Natal 28°25'S 32°13'E
- Mooiplaas (also Mooisplaats), Gauteng 25°49'S 28°05'E
- Moorddrift, Northern Province 24°17'S 28°58'E
- Moramanga (also erroneously Moramenga), E. Madagascar 18°58'S 48°20'E
- Moremi (also -me) Game Reserve, Botswana 22°31'S 27°26'E
- Morendon Estates see Naivasha, Kenya
- Moreton Bay, Australia 27°20'S 153°15'E
- Moribane Forest, Moçambique 20°20'S 33°10'E
- Morogoro, Tanzania 6°47'S 37°49'E
- Morreesburg, Murrysburg Western Cape 33°09'S 18°42'E
- Mosdene Base Camp, Botswana c.9°55'S 24°20'E
- Mosetse, Botswana 20°45'S 26°39'E
- Moshi (also Moschi), Tanzania 3°21'S 37°20'E
- Mossel Bay, Western Cape 34°08'S 22°10'E
- Mouila, Gabon 1°19'S 12°15'E
- Mountain View, Pretoria, Gauteng 25°41'S 28°08'E
- Mountain Zebra Nat. Pk., Cradock Distr., Eastern Cape 32°25'S 24°50'E
- Mount Cameroon, Cameroon 4°12'N 9°11'E
- Mount Chipereone, Moçambique 16°28'S 35°12'E
- Mount Elgon, N. Kavirondo, Kenya 1°08'N 34°33'E
- Mount Everest Game Park, Free State see Harrismith
- Mount Gorongoza, Moçambique 18°24'S 34°06'E
- Mount Kahusi (also Kahoso), Kivu, Zaire 3°19'S 27°44'E
- Mount Kala, Cameroon 3°51'N 12°21'E
- Mount Kenya, Kenya 0°10'S 37°20'E
- Mount Meru, Tanzania 3°14'S 36°45'E
- Mount Mlanje, Malawi 15°57'S 35°36'E
- Mount Moco, Lumbala Prov., Angola c.12°25'S 15°11'E
- Mount Ndi, Kenya 3°18'S 38°27'E
- Mount Ngoakélé, Cameroon 3°03'N 11°13'E
- Mount Selinda (= Chirinda), Zimbabwe 20°27'S 32°40'E
- Mount Sheba, Northern Province 24°51'S 30°45'E
- Mount Sidderi, Cameroon – not traced
- Mount Tonkovi – not traced
- Mount Zomba, Malawi 15°17'S 35°17'E
- Moyamba, Sierra Leone 8°04'N 12°27'W
- Mpanda Distr., Tanzania 6°30'S 31°30'E
- Mpanga Forest/Fort Portal, Uganda 7°50'S 38°02'E
- Mpapua (also Mpwapwa), Tanzania 6°21'S 36°29'E
- Mpata, Ras, Tanzania 10°16'S 40°22'E
- Mpeta, Loangwa River, Zambia 14°09'S 30°51'E
- Mpika Distr., Zambia 12°00'S 31°00'E
- Mpisi, Swaziland 26°25'S 31°32'E
- Mrassine, Morocco – not traced
- Msali Bridge, Zimbabwe – not traced
- Msambweni, Kenya 4°28'S 39°29'E
- Mtito Andei (also N'dei), Kenya 2°41'S 38°10'E
- Mts. Baguezan, Asben (also Azbine), Niger c.17°45'N 9°00'E
- Mtshabezi Valley, Matopos, Zimbabwe c.20°35'S 28°30'E
- Mtubatuba, KwaZulu-Natal 28°25'S 32°11'E
- Mtunzini, KwaZulu-Natal 28°57'S 31°46'E
- Muanzi, Ukamba Prov., Kenya 1°59'S 35°28'E
- Mucusso, Angola 18°00'S 21°23'E
- Muden, KwaZulu-Natal 28°58'S 30°22'E
- Mueni, Uganda – not traced
- Mufindi, Tanzania 8°36'S 35°17'E
- Muhoroni, Kenya 0°05'S 35°18'E
- Mukuyi, Kigoma (also Eigoma) province, Tanzania – not traced
- Murahwa's (also Mwawah's) Hill, Zimbabwe 19°00'S 32°40'E
- Murrysburg, Western Cape 32°00'S 23°30'E
- Musake Hut, Cameroon see Mount Cameroon
- Mussapa River Forest, Sa. Rotanda, Moçambique 19°59'S 33°20'E
- Mussoorie Farm, Mtorashanga, Zimbabwe c.17°30'S 30°20'E
- Musthomo, Kenya – not traced
- Mutale, Northern Province 22°27'S 30°05'E
- Mutare, Zimbabwe 19°00'S 32°40'E
- Muthia, Kenya 1°48'S 38°26'E
- Mutsamudu, Anjouan, Comoro Islands c.12°08'S 44°00'E
- Mvuma, Zimbabwe 19°18'S 30°35'E
- Mwandui (also Mwadui), Shinyanga, Tanzania 3°30'S 33°38'E
- Mwanea (also Mwanza), Tanzania 2°32'S 32°57'E
- Mwanihana Forest, Ifakara, Tanzania 7°50'S 36°50'E
- Mwanza Distr., Tanzania 2°30'S 33°30'E
- Mwanza River, Malawi 16°09'S 34°54'E
- Mwengwa, Zambia 15°17'S 29°59'E
- Mwinilunga School, Zambia 11°45'S 24°26'E
- Mzuzu, N. Malawi 11°27'S 33°55'E
- Nababieb, Northern Cape 29°35'S 17°46'E
- Naboomspruit, Northern Province 24°30'S 28°43'E
- Nachingwea (also Nachingwa), Tanzania 10°23'S 38°46'E
- Nahal Tirza, Israel – not traced
- Nahoon River, East London Distr., Eastern Cape 32°58'S 27°56'E
- Nairobi, Kenya 1°17'S 36°50'E
- Naivasha, Kenya 0°43'S 36°26'E
- Najran, Oasis, Saudi Arabia 17°40'N 44°00'E
- Nakatwa Camp, Caprivi, Namibia 18°10'S 23°26'E
- Nakheila, Atbara River, Sudan 18°11'N 26°39'E
- Nakitawa, Ruwenzori, Uganda – not traced
- Nakuru (also Nakura), Kenya 0°17'S 36°04'E
- Namadara Forest, Mbale Distr., Uganda c.1°05'N 34°10'E
- Namanga Hills, Taita, Kenya 2°42'S 37°01'E
- Namas, Saudi Arabia ?= An Nimas, q.v.
- Namiong (also Nameyong), Cameroon 2°29'N 10°25'E
- Namutere Forest, Busia, Uganda c.0°25'N 34°05'E
- Namwamba Valley, Ruwenzori, Uganda 0°04'N 30°04'E
- Nandi Plateau, Kenya c.0°15'N 35°05'E
- Nangweshi, Zambia – not traced
- Nanisana, C. Madagascar – see Antananarivo
- Nantembo/Zomba, Malawi – not traced
- Nanyuki, Kenya 1°20'N 36°41'E
- Narcibis, Namibia see Otjiverongo
- Naro-Moru Track, Kenya 0°10'S 37°16'E
- Naruangu, Unyoro, Uganda – not traced
- Nasisi Hills, N. Kavirondo, Kenya – not traced
- Nata, Botswana 20°15'S 26°08'E
- Naukluft Mts., Namibia 24°12'S 16°13'E
- Navaro, N. Territory, Gold Coast – not traced
- Nawalia, Zambia = Nawala? 16°35'S 23°50'E
- N'Dalla Tondo (also Ndala Tando), Angola 9°15'S 15°02'E
- Ndanda, Lindi Distr., Tanzania 10°12'S 38°50'E
- Ndarugu, Kenya 1°05'S 37°03'E
- Nderema, Tanzania c. 5°00'S 38°35'E
- Ndi, Kenya see Mount Ndi
- Ndola, Zambia 13°00'S 28°35'E
- N'Douci, Ivory Coast – not traced
- Ndumu (also Ndumo), KwaZulu-Natal 26°53'S 32°16'E

- Nelola, Moçambique – not traced  
 Nelshoogte Forestry Station, Mpumalanga 25°50'S 30°50'E  
 Nelspruit, Mpumalanga 25°28'S 30°59'E  
 Neugia (also Ngia), Kikuyu, Kenya 0°03'N 34°23'E  
 Neu Helgoland, Tanzania – not traced  
 New Hanover, KwaZulu-Natal 29°21'S 30°32'E  
 New Smitsdorp, Northern Province c.24°00'S 29°26'E  
 Ngeleni, Transkei, Eastern Cape – not traced  
 Ngodwana, Mpumalanga 25°34'S 30°39'E  
 Ngoko Station, Cameroon – ambiguous  
 Ngome State Forest, KwaZulu-Natal 27°48'S 31°25'E  
 Ngong, Kenya 1°22'S 36°39'E  
 Ngoya (also Ngyo) Forest, Mtunzini Distr., KwaZulu-Natal 28°52'S 31°43'E  
 Nguelo (also Nguilo), Usambara, Tanzania 8°40'S 33°13'E  
 Niamadzi (also Nya-) River, Zambia 14°49'S 28°27'E  
 Nimule, Sudan 3°36'N 32°03'E  
 Nioka, Kibale-Ituri, Zaire 2°10'N 30°39'E  
 Nioumbadjou, Grande Comore, Comoro Islands c.11°40'S 43°35'E  
 Njombe Distr., Tanzania 9°30'S 34°45'E  
 Njoro, Budonga, Kenya c.0°23'N 34°37'E  
 Nkana, Zambia 12°50'S 28°12'E  
 Nkandla (also Nkandha) Forest, KwaZulu-Natal 28°43'S 31°08'E  
 Nkata (also Nkatha) Bay, Malawi 11°36'S 34°18'E  
 N'kate, Makarikari, Botswana 20°40'S 25°40'E  
 Nkokiyong/Yaoundé, Cameroon – not traced  
 Nkolbisson, Yaoundé Distr., Cameroon 3°52'N 11°28'E  
 N'Kongsamba, Cameroon 4°57'N 9°56'E  
 Nkopola [Hill], Malawi 14°20'S 35°10'E  
 Nkwaleni (also Nkwalini), Zululand, KwaZulu-Natal 28°45'S 31°29'E  
 Noordhoek, Cape Peninsula, Western Cape 34°06'S 18°22'E  
 Noordkap, Mpumalanga 25°40'S 31°05'E  
 North Baiilundo (also Baiilundo), Angola 12°03'S 15°27'E  
 Nosivola, E. Madagascar – NE. of Ambatondrazaka, RNI no.3  
 Nossi-Bé (also Nosy Bé), Madagascar Sambirano 13°20'S 48°15'E  
 Nossob, Northern Cape 26°55'S 20°40'E  
 Nottingham Road, KwaZulu-Natal 29°21'S 30°00'E  
 Notwane Road, Botswana 24°43'S 25°55'E  
 Nowalia, Zambia – not traced  
 Nshongweni, KwaZulu-Natal 29°51'S 30°43'E  
 Nsong (also Nsong), Cameroon 4°59'N 9°49'E  
 Ntusabane/Port St. John's, Transkei, Eastern Cape – not traced  
 Nuanetsi, Zimbabwe 21°26'S 30°43'E  
 Nwanedzi, Northern Province 23°49'S 31°55'E  
 Nyahungwe, Lundi River, Zimbabwe 21°29'S 32°07'E  
 Nyalazi Forest, Mtubatuba Distr., KwaZulu-Natal 28°13'S 32°22'E  
 Nyalazi River, KwaZulu-Natal 28°13'S 32°18'E  
 Nyamandhlovu, Zimbabwe 19°50'S 28°20'E  
 Nyamukubi, Zaire 1°56'S 28°55'E  
 Nyamvumba, Rwanda see Gishwati Forest  
 Nyamodzi River, Mutare Distr., Zimbabwe 19°42'S 32°26'E  
 Nyanda Bush, Pafuri, Northern Province 22°41'S 31°23'E  
 Nyeri, Kenya 0°25'S 37°00'E  
 Nyika Plateau, Malawi 10°40'S 33°50'E  
 Nyinabitala, Ruwenzori, Uganda – not traced  
 Nyilstroom, Northern Province 24°42'S 28°25'E  
 Nyolvley (also Nyolvlei), Northern Province 24°40'S 28°42'E  
 Nyungwe Forest, SW. Rwanda – not traced  
 Nyungwe Village, SW. Rwanda – not traced  
 Ofcolaco, Northern Province 24°06'S 30°23'E  
 Ohrigstad, Northern Province 24°45'S 30°34'E  
 Okahandja, Namibia 21°59'S 15°52'E  
 Okaukuejo, Etosha Pan, Namibia 19°11'S 15°55'E  
 Oku, Kumbo Prefecture, Cameroon 6°15'N 10°26'E  
 Oldeani, Tanzania 3°21'S 35°33'E  
 Old Shinyanga, Tanzania 3°34'S 33°23'E  
 Olduvai Gorge, Tanzania 2°58'S 35°22'E  
 Olifants Camp, Northern Province 24°03'S 31°45'E  
 Olorgasailie (Olorgesaille), Kajiado, Kenya 1°34'S 36°27'E  
 Omafú (also Omafo), Ovamboland, Namibia 17°26'S 15°56'E  
 Omaruru, Namibia 21°26'S 15°56'E  
 Omuramba, Omatako River, Namibia 17°57'S 20°25'E  
 Omuramba, Namibia 19°03'S 14°05'E  
 Ondangu (also Ondangua), Ovamboland, Namibia 17°56'S 15°33'E  
 Ong, Namibia – untraceable abbreviation  
 Ongvati (also Onguati) River, Outjo River, Namibia – ambiguous  
 Onverwacht, Ellisras Distr., Northern Province 24°02'S 27°41'E  
 Ookiep, Namaqualand, Northern Cape 29°36'S 17°52'E  
 Opro River Reserve, Ghana 7°11'N 1°48'W  
 Orania, Hopetown Distr., Northern Cape 29°48'S 24°55'E  
 Oranje krag, Free State 30°36'S 25°29'E  
 Orpen, Northern Cape = Eileen Orpen Dam 24°46'S 31°54'E  
 Oruvandjei, Namibia 18°17'S 13°37'E  
 Oshakati, Namibia 17°38'S 15°37'E  
 Oshikango, Namibia 17.24–15.53/17.52–15.34  
 Oshivello (also Oshivelo), Namibia 18°37'S 17°35'E  
 Oso River, NW. Kivu Province, Zaire 1°09'S 27°22'E  
 Otjitambi, Namibia 18°22'S 12°50'E  
 Otjiu, Namibia 18°15'S 13°15'E  
 Otjiverongo (also Ojivarongo), Namibia – ambiguous  
 Otjosongombe, Waterberg, Namibia c.20°20'S 17°18'E  
 Ouallega (also Wallega), Ethiopia c.9°20'S 35°06'E  
 Ouama (also Uama), Ethiopia 8°32'N 36°40'E  
 Oudebos on Garden Route, Eastern Cape 34°00'S 24°13'E  
 Oudtshoorn, Western Cape 33°35'S 22°12'E  
 Oued Amra, N. of Iseles, Algeria 23°50'S 6°00'E  
 Ouesso, Republic of Congo 1°37'N 16°04'E  
 Ourigane, Haut Atlas, Morocco – not traced  
 Oukaimeden, Haut Atlas, Morocco – not traced  
 Oussayaye, Senegal – not traced  
 Outlook Estate, Northern Province see Farm Oldreive's  
 Ovamboland, Namibia c.17°45'S 16°00'E  
 Oxbow, Maloti Mts., Lesotho 28°45'S 28°40'E  
 Paarl, Western Cape 33°44'S 18°58'E  
 Pafuri, Northern Province 22°27'S 31°21'E  
 Pakhuis Pass, Western Cape 32°09'S 19°00'E  
 Palapye Road, Botswana 22°33'S 27°08'E  
 Palindaba, KwaZulu-Natal 28°25'S 32°22'E  
 Panfontein/Bloemhof, North-West 27°13'S 25°25'E  
 Pangani Distr., Tanzania 5°30'S 38°50'E  
 Panza, Transkei, Eastern Cape 31°10'S 30°10'E  
 Papiesvlei, Cape – not traced  
 Paraa, M. Falls Park, Uganda 2°18'N 31°35'E  
 Parc de Tsimbazaza, C. Madagascar see Antananarivo  
 Paroto-Rungwe Mission, Tanzania c.9°23'S 33°35'E  
 Parys, Free State 26°55'S 27°27'E  
 Pella, Cape – ambiguous  
 Penge, Lydenburg Distr., Mpumalanga 24°22'S 30°18'E  
 Penhalonga, Zimbabwe 18°57'S 32°42'E  
 Pentonville (? Farm), Vaalwater Distr., Northern Province 23°30'S 27°50'E  
 Percy Fyfe Nature Reserve, Potgietersrus, Northern Province 24°03'S 29°10'E  
 Perinet (= Station Perinet), E. Madagascar 19°00'S 48°50'E  
 Perrégaux, Prov. Oran, Algeria 35°35'N 0°04'E  
 Perseverance, Rietbron Distr., Eastern Cape 32°31'S 23°52'E  
 Pesu Gorge, Sengwe River, Zimbabwe – not traced  
 Philippeville, Algeria 36°55'N 7°09'E  
 Phosphonyane (also Poponyane) River Falls, Swaziland 25°50'S 31°23'E  
 Phuza, Moçambique = Pussa? 24°29'S 33°49'E  
 Pienaarspoort, Northern Province 25°43'S 28°24'E  
 Pienaar river, Pretoria Distr., Gauteng 25°12'S 28°17'E

- Pietermaritzburg, KwaZulu-Natal 29°34'S  
30°24'E
- Pietersburg, Northern Province 23°54'S  
29°27'E
- Piet Retief, Mpumalanga 25°59'S 31°15'E
- Piketberg (also Piquetberg), Western Cape  
32°50'S 18°45'E
- Pilanesberg Nat. Pk., North-West 25°12'S  
27°05'E
- Pilgrim's Rest, Mpumalanga 24°58'S  
30°49'E
- Pinelands, Western Cape 33°55'S 18°30'E
- Pinetown, KwaZulu-Natal 29°50'S 30°52'E
- Piste Capitaine Dubois, Comoro Islands –  
not traced
- Piton Coté, C. Madagascar – not traced
- P.K. le Roux Dam, Free State 30°00'S  
24°47'E
- Pleisieskloof Onder, Transvaal – not traced
- Plettenberg Bay, Western Cape 34°05'S  
23°25'E
- Pofadder, Northern Cape 29°08'S 19°23'E
- Politisi, Northern Province 23°46'S  
30°06'E
- Pongola, Mpumalanga 27°23'S 31°38'E
- Pongola River, Mpumalanga 26°52'S  
32°20'E
- Popa Rapids, Kavango, Namibia 18°07'S  
21°35'E
- Potokwe Bridge, Zimbabwe – not traced
- Pori (also Poro), Landjoro, Kenya 1°14'N  
36°37'E
- Porseleinberg S of Riebeekskasteel,  
Western Cape 33°27'S 18°53'E
- Port Elizabeth, Eastern Cape 33°58'S  
25°36'E
- Port KwaZulu-Natal see Durban
- Port Said, Egypt 31°20'N 32°15'E
- Port Shepstone, KwaZulu-Natal 30°44'S  
30°28'E
- Port St. John's, Transkei, Eastern Cape  
31°38'S 29°33'E
- Port Sudan (Bur Sudan), Sudan 19°37'N  
37°14'E
- Potchefstroom, North-West 26°43'S  
27°06'E
- Potgietersrus, Northern Province 24°11'S  
29°00'E
- Presidentsrus, Witbank Distr., Transvaal –  
not traced
- Pretoria, Gauteng 25°43'S 28°11'E
- Pretoriuskop, Mpumalanga 25°10'S  
31°16'E
- Punda Milia Rest Camp (also Punda  
Maria), Northern Province 22°41'S  
31°02'E
- Pungo Andongo, Angola 9°40'S 15°40'E
- Qaraah Village, Saudi Arabia 29°51'N  
40°17'E
- Quanuna, Assi, Arabia – not traced
- Queenstown, Eastern Cape 31°54'S  
26°53'E
- Quicoloongo, Angola 8°30'S 15°18'E
- Quinera River, Eastern Cape 33°00'S  
27°55'E
- Quirimbo, Angola 10°40'S 14°15'E
- Qum Fida, Arabia – not traced
- Rabat, Morocco 33°55'N 7°00'W
- Rahama, Oned, Algeria – not traced, see  
Mazagan
- Randfontein Distr., Gauteng 26°15'S  
27°40'E
- Ranomafana, E. Madagascar 24°33'S  
47°00'E
- Ravensworth, KwaZulu-Natal 29°19'S  
30°37'E
- Reara Ranch, ?Zimbabwe – not traced
- Redelingshuys, KwaZulu-Natal 32°29'S  
18°32'E
- Red House, Esatern Cape 33°50'S 25°34'E
- Rehoboth, Namibia 23°20'S 17°03'E
- Rekomitjie, Zambezi Valley, Zimbabwe –  
not traced
- Renosterpoort, Bronkhorstspruit Distr.,  
Mpumalanga c. 25°30'S 28°40'E
- Resolution, Albany Distr., Eastern Cape  
33°10'S 26°37'E
- Rharis (Djebel), Algeria c.6°15'N 4°55'E
- Ribao, Cameroo 9°43'N 13°55'E
- Richard's Bay, KwaZulu-Natal 28°49'S  
32°06'E
- Richmond, KwaZulu-Natal – ambiguous
- Richtersveld, Northern Cape, c.28°10'S  
17°00'E – 29°00'S 17°30'E
- Rietfontein, Transvaal – ambiguous
- Rietfontein/Verona, Cape – ambiguous
- Rietvlei, Gauteng 25°54'S 28°18'E
- Rio Luenha, Moçambique see Ruenya  
River
- Risitu River, Melsetter Distr., Zimbabwe –  
not traced
- Riverside, Zimbabwe see Bulawayo
- Riyadh, Saudi Arabia 24°40'N 46°52'E
- Rokelen, Morocco – not traced
- Roodeplaat [Dam], Gauteng 25°38'S  
28°23'E
- Roodepoort, Mpumalanga 25°44'S 29°49'E
- Rooiberg, Robertson Distr., Western Cape  
32°22'S 19°41'E
- Rooiberg, Northern Province 24°49'S  
27°48'E
- Rooiplaat, Transvaal – not traced
- Ruenya River, Shangara, Moçambique  
16°24'S 33°48'E
- Rugege Forest, Ruanda Distr., Rwanda –  
not traced
- Rukuru River, Malawi 12°26'S 33°46'E
- Rundu (also Runtu), Okavango, Namibia  
17°55'S 19°43'E
- Ruo Valley, Moçambique c.16°33'S  
35°09'E
- Rustenburg, Nort West 25°40'S 27°15'E
- Rusumo, SE. Rwanda – not traced
- Rwenzori Range, Uganda 0°23'N  
29°54'E
- Sasaveld, Western Cape 33°57'S 22°32'E
- Sabeji School, Zambia see Mwinilunga
- Sabie, Mpumalanga 25°10'S 30°48'E
- Sahambava (also erroneously Sahambavy),  
C. Madagascar, Fianarantsoa region
- Sakaraha, W. Madagascar 22°54'S  
44°32'E
- Sakarami (also Sakarani), Usambara Mts.,  
Tanzania 4°49'S 38°24'E
- Sakaramy, NE. Madagascar – 20 km S. of  
Diego Suarez
- Salisbury, Zimbabwe see Harare
- Saloni River Forest, Marromeu,  
Moçambique 18°35'S 35°45'E
- Salwa (Duhet), Bahrain 25°27'N 50° 40'E
- Sambirano River, Madagascar Sambirano,  
c.14°00'S 48°40'E
- Samburu, Kenya 1°15'N 37°00'E
- Same, Tanzania 4°04'S 37°44'E
- Samfya, Zambia 11°22'S 29°30'E
- Sanaa, Yemen 15°23'N 44°10'E
- Sandoa, Zaire 9°41'S 22°52'E
- Sanguéré Sara, Cameroon 09°12'N 13°30'E
- Sangwali, E. Caprivi, Namibia 18°15'S  
23°34'E
- San Martinho, Moçambique 25°17'S  
33°15'E
- Sao Antao gr. Porto Novo, Cabo Verde  
17°05'N 25°50'W
- Sao Tiago Praia, Cabo Verde 14°45'N  
24°12'W
- Sao Vincente, Rib. Juliao, Cabo Verde  
16°40'N 26°35'W
- Sapi/Zambezi Confluente, Zimbabwe  
15°35'S 29°33'E
- Sarepta (now Saratow), Russia 51°30'N  
45°50'E
- Sarnia, KwaZulu-Natal 29°50'S 30°52'E
- Sarnia Farm, Zimbabwe see Burmah  
Valley
- Sarodrano Forest, W. Madagascar – at km  
122 on Ambondromany-Port Bergé road
- Sasolburg, Free State 26°49'S 27°50'E
- Satara Camp, Northern Province 24°23'S  
31°47'E
- Save River, Massangena Distr.,  
Moçambique 21°00'S 35°02'E
- Savuli (also Savuti) Channel, Botswana  
18°37'S 24°04'E
- Sawmills, Zimbabwe 19°35'S 28°03'E
- Schambrora, Okavango, Namibia – not  
traced
- Schweizer-Reneke, North-West 27°11'S  
25°20'E
- Scottsburgh, KwaZulu-Natal 30°17'S  
30°45'E
- Seaview, Cape – ambiguous
- Sebakwe, Zimbabwe 19°00'S 30°15'E
- Sebdou, Algeria 34°40'N 1°22'W
- Sedgefield, Western Cape 34°00'S 22°48'E
- Sédiou, Senegal 12°44'N 15°33'W
- Sekondi, Gold Coast (now Ghana) 4°58'N  
1°47'W
- Selati, Northern Province 24°03'S 30°38'E
- Selikotane, Senegal – not traced
- Selukwe (now Shurugwi ?), Zimbabwe  
19°37'S 29°59'E
- Selungwe Hills, Zimbabwe = Selukwe?
- Sepopa, Ngamiland, Botswana 18°45'S  
22°10'W
- Sept Lacs, S. Madagascar – Betioky Sud  
underprefecture, on old Tulear-  
Tongobory road
- Serahs (also Serahks), Turkmenia  
c.36°30'N 61°30'E
- Serra Rotanda, Moçambique 19°36'S  
33°08'E
- Sesse Isl., Lake Victoria, Tanzania 2°28'S  
33°04'E
- Seven Weeks Poort, Western Cape 33°22'S  
21°25'E
- Seweweekspoort see Seven Weeks Poort
- Seziwa (also Sezibwa) River, Uganda  
1°22'N 32°44'E
- Sfax, Tunisia 34°44'N 10°46'E

- Shaib Sudair, Arabia – not traced  
 Shakawe, Botswana 18°21'S 21°52'E  
 Shangani, Zimbabwe 19°45'S 29°27'E  
 Shangomlo, Zambia 14°32'S 22°17'E  
 Shangwana, Ingwavuma Distr., KwaZulu-Natal = Sihangwane 27°04'S 32°25'E  
 Sharaghib, Saudi Arabia – not traced  
 Shashi River, Zimbabwe c.22°00'S 29°20'E  
 Sheik Othman/Aden, Yemen 12°50'N 45°00'E  
 Shilouvane [Mission], Northern Province 24°02'S 30°16'E  
 Shimha Hills, Kenya 4°13'S 39°25'E  
 Shingwidzi Mission, Northern Province 23°01'S 30°44'E  
 Shinyanga Distr., Tanzania 3°40'S 33°30'E  
 Shire Valley, Malawi c.17°30'S 35°15'E  
 Shombole, Kenya 2°08'S 36°06'E  
 Shongweni Dam, KwaZulu-Natal 29°51'S 30°43'E  
 Siavanga (also Siavonga), Zambia 16°32'S 28°43'E  
 Sidi-bel-Abbes, Prov. Oran, Algeria c.35°12'N 0°45'W  
 Sidi Ferruch, Algeria 36°45'N 2°52'E  
 Sidi M'guid – not traced  
 Sidwashini, Swaziland 26°11'S 31°05'E  
 Sihangwana Forest, KwaZulu-Natal 27°00'S 32°15'E  
 Sikororo, Northern Province c.24°50'S 30°44'E  
 Silverton, Gauteng 25°44'S 28°18'E  
 Simonstown, Western Cape 34°12'S 18°30'E  
 Sinis, Great Atlas, Morocco – not traced  
 Sinoia (now Chinhoyi), Zimbabwe 17°22'S 30°25'E  
 Sipofaneni, Swaziland 26°41'S 31°41'E  
 Sishen Mine, Northern Cape 27°47'S 22°57'E  
 Sissekah, Namibia c. 19°25'S 17°30'E  
 Skukuza, Mpumalanga 25°00'S 31°35'E  
 Slanghoek [Mts.], Western Cape 33°37'S 19°10'E  
 Slypteendrift/New Smitsdorp, Northern Provincel 24°14'S 28°09'E  
 Smithfield Distr., Free State 30°05'S 26°30'E  
 Sordwana Bay, KwaZulu-Natal see Sordwana Bay  
 Soebatsfontein, Northern Cape 30°07'S 17°35'E  
 Sokoke Forest, Gedi, Kenya 3°29'S 39°50'E  
 Sokodé, Togo 8°59'N 1°08'E  
 Solelo, Ganale River, Ethiopia – ambiguous  
 Somahoo, Gold Coast – not traced  
 Sombani [River], Malawi 15°29'S 35°44'E  
 Songea Distr., Litembo, Tanzania 10°40'S 35°45'E  
 Songo River, Siabuwa, Binga, Zimbabwe 17°35'S 27°26'E  
 Sordwana Bay Nat.Pk., KwaZulu-Natal 27°32'S 32°41'E  
 Sous River Mouth, Morocco – see Inesgane  
 Soutpan [also Tsواing] Pretoria Distr., Gauteng 25°24'S 28°06'E  
 Soutpan, Soutpansberg, Northern Province 22°58'S 29°18'E  
 Soutpansberg, TNorthern Province c.23°00'S 29°40'E  
 Springbok, Northern Cape 29°40'S 17°53'E  
 Stanger, KwaZulu-Natal 29°20'S 31°18'E  
 Stanleyville, Zaire 0°30'N 25°12'E  
 Stella Bush, KwaZulu-Natal c.29°50'S 31°00'E  
 Stellenbosch, Western Cape 33°56'S 18°51'E  
 Sterkstroom, Eastern Cape 31°33'S 26°34'E  
 Steynsburg, Eastern Cape 31°18'S 25°49'E  
 St. Lucia Bay, KwaZulu-Natal 28°22'S 32°35'E  
 Stoerhoff, Middelburg Distr., Mpumalanga 26°50'S 28°03'E  
 Store Pan, Zimbabwe see Chikwarakwara  
 Storms River Mouth Coastal Nat.Pk., Western Cape 34°02'S 23°54'E  
 Stormsriviermond, Western Cape see Storms River Mouth  
 Struben's Valley (also Strubenvale), Gauteng 26°15'S 28°28'E  
 Studer's Pass, Garies, Northern Cape 30°25'S 18°04'E  
 Stutterheim, Eastern Cape 32°34'S 27°25'E  
 Sudwala Caves, Northern Province 25°46'S 30°38'E  
 Suider Paarl, Western Cape 33°46'S 18°57'E  
 Suikerbosrand (also -rant) Nature Reserve, Gauteng 26°30'S 28°15'E  
 Suna, S. Kavirondo, Kenya 1°04'S 34°24'E  
 Sundi, Principe Isl., São Tomé e Príncipe c.1°26'N 7°25'E  
 Sutherland Distr., Northern Cape 32°30'E 20°30'E  
 Swartbergpas, Western Cape 33°19'S 22°03'E  
 Swellendam, Eastern Cape 34°02'S 20°26'E  
 Tabora Distr., Tanzania 5°30'S 32°30'E  
 Tachdirt, Morocco – not traced  
 Taghjicht, Oasis see Bou Izakarn  
 Taif, Saudi Arabia 21°03'N 40°56'E  
 Taita (also Teita), Kenya 3°30'S 38°30'E  
 Takougout (also Takoukout), Damergou, Niger c.14°15'N 9°00'E  
 Talala/Benguella, Angola – not traced  
 Tamataeve, E. Madagascar 18°10'S 49°20'E  
 Tamsu, Okavango, Namibia 18°35'S 20°34'E  
 Tana River, Kenya 2°32'S 40°31'E  
 Tanga Distr., Tanzania 4°55'S 38°55'E  
 Tanger, Morocco 35°43'N 5°50'W  
 Taourirt, Morocco 34°25'S 2°03'E  
 Tarima (also Tarim), Arabia – ambiguous  
 Taroudant, Morocco c. 30°30'N 8°50'W  
 Tassilo des Ajers, Mare d'Issouane – not traced  
 Taveta, Kenya 3°25'S 37°42'E  
 Tambura (also Tembura), Bahr-el-Ghazal, Sudan 5°36'N 27°28'E  
 Tendaguru, Lindi Distr., Tanzania – not traced  
 Terere Forest Reserve/Nthalire, Malawi c.10°25'S 33°40'E  
 Terouane (also Teroane), Tibesti, Chad 20°26'N 18°14'E  
 Thabazimbi, Northern Province 24°35'S 27°25'E  
 Thabina, Zoutpansberg Distr., Northern Province 23°58'S 30°17'E  
 Thamalakan River, Maun Distr., Botswana 20°08'S 23°23'E  
 The Downs [Farm], Zoutpansberg Distr., Northern Province c.22°57'S 29°53'E  
 The Haven, Transkei, Eastern Cape 32°14'S 28°53'E  
 Thies Region, Senegal 14°45'N 16°50'W  
 Thomson Falls (= T.F. Mission, Eastern Cape 32°01'S 28°33'E)  
 Thomson's Falls, Kenya 0°01'N 36°25'E  
 Thorny Bush, Pietermaritzburg Distr., KwaZulu-Natal 29°42'S 30°28'E  
 Three Sisters, Northern Province 24°37'S 30°47'E  
 Tibati, Cameroon 6°28'N 12°38'E  
 Tiger Valley, Namibia 19°38'S 17°40'E  
 Tilleriot, Ht. Atlas, Morocco – not traced  
 Timbadola Forest, Louis Trichardt Distr., Northern Province – not traced  
 Timhadit region, Morocco – not traced  
 Tirza, Israel see Nahal Tirza  
 Tiwi, Mombasa, Kenya 4°15'S 39°32'E  
 Tleta Akhssas, Antiatlas, Morocco – not traced  
 Tod's Hotel, Zimbabwe 21°17'S 29°35'E  
 Toleni, KwaZulu-Natal 30°57'S 28°53'E  
 Tondon, Dubreka Distr., Rep. of Guinea 10°22'N 13°21'W  
 Tongaat, KwaZulu-Natal 29°34'S 31°07'E  
 Touws River, Western Cape 33°44'S 21°10'E  
 Tozeur (also Tawzar), Tunisia 33°55'N 8°08'E  
 Trompsburg, Free State 30°03'S 25°47'E  
 Troutbeck District, Zimbabwe 18°10'S 32°50'E  
 Tsau, Ngamiland, Botswana 20°09'S 22°27'E  
 Tsavo Nat.Pk., Kenya 3°00'S 38°40'E  
 Tshakoma (also Tshakhuma), Zoutpansberg, Northern Province 23°03'S 30°18'E  
 Tshane, Botswana = Tshwane? 22°24'S 22°03'E  
 Tsimbazaza (Parc), C. Madagascar see Antananarivo  
 Tsitsikama (also -kamma) Nat. Res., Western Cape 33°58'S 23°45'E  
 Tsodilo Hills, Botswana 18°45'S 21°46'E  
 Tsotsoroga Pass, Botswana (? erroneously for Tsotsoroga Pan 18°43'S 24°21'E)  
 Tsumeb, Namibia 19°14'S 17°43'E  
 Tuchila [River], Malawi 16°13'S 35°17'E  
 Tugela Mouth, KwaZulu-Natal 29°13'S 31°30'E  
 Tulbagh Road, Western Cape 33°19'S 19°06'E  
 Tulear (now Tolari), S. Madagascar 23°25'S 43°40'E  
 Tunis, Tunisia 36°54'N 10°10'E  
 Turk Mine, Zimbabwe 19°48'S 28°51'E  
 Twee Rivieren, Mpumalanga 26°27'S 30°36'E  
 Twee Rivieren, Kalahari Gemsbok Pk., Botswana 26°26'S 20°27'E

- Two Camps, Kangema, Aberdares, Kenya  
c.0°40'S 37°00'E
- Tzaneen, Northern Province 23°50'S  
30°10'E
- Uaso Nyiro (also Ewaso Ngiro), Kenya  
c.2°00'S 36°00'E
- Uele River, Zaire 4°09'N 22°26'E
- Uitenhage, Eastern Cape 33°46'S 25°24'E
- Uitsoek, Mpumalanga. 25°16'S 30°33'E
- Ukami Mts., Tanzania 8°30'S 35°44'E
- Ukerewe Island, Tanzania 2°03'S 33°00'E
- Umbeluzi (also Umbeluszi) River,  
Moçambique 26°00'S 32°30'E
- Umbilo, KwaZulu-Natal see Durban  
[suburb]
- Umdoni Park, KwaZulu-Natal 30°24'S  
30°41'E
- Umgababa, KwaZulu-Natal 30°08'S  
30°50'E
- Umgazi River Mouth, KwaZulu-Natal  
31°41'S 29°27'E
- Umgeni Dam, KwaZulu-Natal 29°35'S  
30°37'E
- Umgungi Valley, KwaZulu-Natal c.29°30'S  
30°35'E
- Umgusa Forcst, Sawmills, Zimbabwe  
19°26'S 27°53'E
- Umhlahli, KwaZulu-Natal 29°29'S 31°14'E
- Umhlanga Rocks, KwaZulu-Natal 29°43'S  
31°05'E
- Umhlatuzi River, KwaZulu-Natal 28°50'S  
32°00'E
- Umhloti Beach, KwaZulu-Natal 29°39'S  
31°08'E
- Umkomas, KwaZulu-Natal 30°12'S  
30°49'E
- Umlaas Road, KwaZulu-Natal 29°44'S  
31°31'E
- Umtali, Zimbabwe see under Mutare
- Umtata, Transkei, Eastern Cape 31°35'S  
28°47'E
- Umtentweni, KwaZulu-Natal 30°43'S  
30°27'E
- Umvuma, Zimbabwe see under Mvuma
- Umvumvuma, Mutare Distr., Zimbabwe –  
= Umvumvumvum River NE. of Hot  
Springs (no coordinates available)
- Umwinsidale, Zimbabwe – 17°34'S  
31°12'E
- Underberg, KwaZulu-Natal 29°48'S  
29°30'E
- Upington, Northern Cape 28°27'S 21°15'E
- Upper Kasai Distr., Zaire c.6°00'S 22°00'E
- Usa, Tanzania 3°22'S 36°51'E
- Usakos, Namibia 22°00'S 15°36'E
- Usambara, Tanzania 5°00'S 38°30'E
- Usa River, Tanzania 3°26'S 36°51'E
- Usoga, Kayanga, Uganda – not traced
- Usumbura, N. Lake Tanganyika, Burundi  
3°23'S 29°22'E
- Utrecht, KwaZulu-Natal 27°39'S 30°20'E
- Uyahungwe, Lundi River, Zimbabwe see  
Nyahungwe
- Vaalwater, Northern Province 24°18'S  
28°05'E
- Vanderkloof, Northern Cape 30°00'S  
24°43'E
- Van dcr Merwe station, Tvl – not traced
- Van Niekerk Hotel, Zimbabwe see Gwai  
Bridge
- Van Reenen, KwaZulu-Natal 28°22'S  
29°23'E
- Vanhynsdorp, Western Cape 31°37'S  
18°44'E
- Van Rhyn's Pass, Northern Cape 31°23'S  
19°00'E
- Van Zylsrus, Gordonia Distr., Northern  
Cape 28°43'S 17°18'E
- Verona, Cape see Rietfontein
- Verulam, KwaZulu-Natal 29°39'S 31°03'E
- Verwoerdburg [now Centurion], Gauteng  
25°50'S 28°13'E
- Victoria, Cameroon 4°01'N 9°12'E
- Victoria, KwaZulu-Natal 29°02'S 30°08'E
- Victoria Distr., Zimbabwe c.20°00'S  
31°00'E
- Victoria Falls, Zimbabwe 17°55'S 25°45'E
- Victoria-Nyansa, Tanzania 1°00'S 33°00'E
- Vila Machado, Moçambique 19°17'S  
34°12'E
- Vincent Makinda, Bolo/Bulu – not traced
- Violsdrif, Northern Cape 28°50'S 17°39'E
- Virunga Mts., Uganda 1°00'S 29°50'E
- Vivo, Northern Province 23°03'S 29°17'E
- Vjamba Forest, Kungwe, Tanzania c.6°30'S  
30°45'E
- Vohémar, N. Madagascar 13°26'S 50°00'E
- Voi, Kenya 3°21'S 38°34'E
- Vrededorf Road, Free State – uncertain;  
Vrededorf: 27°05'S 27°22'E
- Vredendal, Cape Province – ambiguous
- Vryburg, North-West 26°57'S 24°44'E
- Vumba Mtns., Zimbabwe c.19°05'S  
32°44'E
- Vyeboom/Nylstroom, Northern Province –  
not traced
- Wadi Amq. Arabia – not traced
- Wadi Hama, Arabia – not traced
- Wadi Mizbil, Arabia – not traced
- Wadi Shaqa, Arabia – not traced
- Wadi Tisba, Saudi Arabia – not traced
- Wadi Yamaniya, Arabia – not traced
- Wakibara, Uganda – not traced
- Walikali (also Walikale), W. Kivu Prov.,  
Zaire 1°25'S 28°03'E
- Wallekraal, Northern Cape 30°24'S  
17°31'E
- Wankie (now Hwange), Zimbabwe 18°20'S  
26°25'E
- Wapu Hills, Turkana, Kenya c.0°40'N  
37°53'E
- Warmbad (Warmbaths), Northern Province  
24°53'S 28°18'E
- Warner Beach, KwaZulu-Natal 30°04'S  
30°52'E
- Warrenton, Northern Cape 28°07'S 24°51'E
- Warri, Niger River, Nigeria 4°18'N 6°15'E
- Warringo River, Unyoro, Uganda – not  
traced
- Warburg, KwaZulu-Natal 29°26'S 30°35'E
- Wassaw District, Gold Coast – not traced
- Waterberg, Northern Province 24°00'S  
28°00'E
- Waterberg, Namibia 20°31'S 17°14'E
- Waterford, Cape – ambiguous
- Waterford, Transvaal – ambiguous
- Waterval Boven, Mpumalanga 25°39'S  
30°20'E
- Waterval Onder, Mpumalanga 25°39'S  
30°23'E
- Wau, Sudan – ambiguous
- Waza, Cameroon = Waza Garou 11°15'N  
14°40'E
- Weenen, KwaZulu-Natal 28°51'S 30°05'E
- Wemi (also Wimi) River, Toro (Toro),  
Uganda – not traced
- Weza Forest, KwaZulu-Natal 30°36'S  
29°45'E
- White Nile, Sudan 15°38'N 32°31'E
- Wilderness, Western Cape 33°59'S 22°35'E
- Willowmore, Eastern Cape 33°18'S  
23°30'E
- Wincka, SW. Rwanda – not traced
- Windhoek, Namibia 22°34'S 17°06'E
- Wingate, Zimbabwe 17°37'S 31°10'E
- Winklespruit, KwaZulu-Natal 30°06'S  
30°51'E
- Witkoppen, Gauteng see Johannesburg
- Witrivier (White River), Mpumalanga  
25°20'S 31°01'E
- Witteklip, Cape – ambiguous
- Wolfshok, Northern Cape 30°22'S 18°07'S
- Woodbush Forestry, Northern Province  
c.23°47'S 30°00'E
- Worcester, Western Cape 33°39'S 19°26'E
- Woreda, Ganale River, Ethiopia –  
ambiguous
- Wyllie's Poort, Soutpansberg, Northern  
Province 22°53'S 29°56'E
- Xmas Pass, Mutare Distr., Zimbabwe  
18°53'S 32°40'E
- Yabassi Distr., Cameroon 4°28'N 9°58'E
- Yakasu, Upper Congo – not traced
- Yala, Cameroon 4°35'N 11°45'E
- Yaoundé, Cameroon 3°52'N 11°31'E
- Yapo South, Cameroon – not traced
- Yana (also Yarna), Cameroon 4°44'N  
14°15'E
- Yatta Kitui (also Kitui Yatta), Kenya  
1°15'S 37°45'E
- Yellowwoods see Balgowan, KwaZulu-  
Natal
- Yoko, Cameroon – ambiguous
- Yotvata, Israel c.29°50'N 35°10'E
- Yzerfontein, Western Cape 33°21'S  
18°09'E
- Zallaq, Bahrain – not traced
- Zambezi Rapids, Zambia – not traced
- Zanzibar Isl., Tanzania 6°10'S 39°20'E
- Zaragoza, Spain 41°38'N 0°55'W
- Zaria, Samaru, Nigeria 11°04'N 7°42'E
- Zastron, Free State 30°22'S 27°08'E
- Zebch near Sebdou, Algeria – not traced
- Zebediela, Northern Province 24°18'S  
29°15'E
- Zika Forest, Entebbe, Uganda 0°05'N  
32°30'E
- Zilo, Katanga Prov., Zaire 10°30'S 25°28'E
- Zinder, Damagaram, Niger 13°45'N 9°00'E
- Zoetendals Vallei (also Zoetendalsvlei),  
Western Cape 34°43'S 19°59'E
- Zomba, Malawi 15°27'S 35°20'E
- Zomba Plateau, Malawi 15°20'S 35°18'E
- Zombitsy matsabory Reserve, W.  
Madagascar – ca. 15 km W. of Sakaraha
- Zungeru (also Zungero, Zunguru), Nigeria  
9°57'N 9°51'E
- Zusterstroop, Gauteng 25°33'S 28°57'E
- Zuurberg (also Suurberg) Pass, Eastern  
Cape – see Eagle's Crag

## LIST OF SPECIES AND SUBSPECIES BY COUNTRIES

### ALGERIA (10)

*Acanthovalva*  
*inconspicuaria*  
*Narrara*  
*nevae nevae*  
*Isturgia*  
*deerraria*  
*disputaria*  
*spodiaria mizanensis*  
*Itame*  
*vincularia latefasciata*  
*Boarmioides*  
*colpias*  
*Chiasmia*  
*aestimaria*  
*latinarginaria*  
*sudanata*

### ANGOLA (30)

*Acanthovalva*  
*inconspicuaria*  
*Plateophia*  
*acrobelia*  
*Milocera*  
*arcifera*  
*aurora*  
*dubia*  
*scoblei*  
*Isturgia*  
*catalaunaria*  
*deerraria*  
*exospilata*  
*presbitaria*  
*Chiasmia*  
*affinis*  
*angolae*  
*crassata*  
*feraliata*  
*furcata*  
*grimmia*  
*inconspicua inconspicua*  
*kilimanjarensis*  
*maculosa*  
*majestica*  
*marmorata*  
*ostentosaria*  
*pernoptera*  
*procidata procidata*  
*punctilinea*  
*rectistriaria*  
*rhabdophora*  
*separata separata*  
*streniata streniata*  
*subvaria*

### BAHRAIN (2)

*Isturgia*  
*pervaria*  
*Chiasmia*  
*syriacaria*

### BOTSWANA (25)

*Acanthovalva*  
*inconspicuaria*  
*Platypepla*  
*flava*

*persubtilis*  
*Plateophia*  
*acrobelia*  
*Isturgia*  
*catalaunaria*  
*deerraria*  
*supergressa*  
*Chiasmia*  
*ammodes*  
*brogusaria brongusaria*  
*diarmodia*  
*furcata*  
*grimmia*  
*inaequilinea eremias*  
*inconspicua inconspicua*  
*kilimanjarensismarmorata*  
*multistrigata filiput*  
*ngami*  
*normata*  
*punctilinea*  
*streniata streniata*  
*subcurvaria subcurvaria*  
*suriens*  
*tecnium*  
*trizonaria*

**BURUNDI (2)**

*Chiasmia*  
*kilimanjarensis*  
*rhabdophora*

**CABO VERDE (2)**

*Isturgia*  
*deerraria*  
*Chiasmia*  
*sudanata*

**CAMEROON (51)**

*Milocera*  
*atreus*  
*divorsa*  
*diffusata*  
*pelops*  
*scoblei*  
*sexcornuta*  
*thyestes*  
*ustata*  
*Isturgia*  
*catalaunaria*  
*disputaria*  
*exospilata*  
*Chiasmia*  
*adelpha*  
*affinis*  
*albivia*  
*angolae*  
*assimilis*  
*collaxata*  
*conturbata*  
*crumenata*  
*curvilineata*  
*feraliata*  
*fontainei*  
*fidiisparsa*  
*fuscataria*  
*impar*  
*impocera*  
*inouei ponentis*  
*inguinata*  
*johnstoni*  
*kilimanjarensis*

*maculosa*  
*majestica*  
*multistrigata multistrigata*  
*nana*  
*normata*  
*ostentosaria*  
*paucimacula*  
*pernoptera*  
*permarginata*  
*plutocrypis*  
*rectistriaria*  
*sangueresa*  
*separata separata*  
*streniata streniata*  
*subcretata*  
*subvaria*  
*sudanata*  
*threnopis*  
*trigonoleuca*  
*uniflata*  
*unigeminata*

### CENTRALAFRICAN REPUBLIC (1)

*Chiasmia*  
*affinis*

### CHAD (3)

*Chiasmia*  
*latinarginaria*  
*streniata streniata*  
*sudanata*

### COMOROS (6)

*Isturgia*  
*comorensis*  
*contexta*  
*tutivirgaria*  
*Chiasmia*  
*crassilembaria*  
*normata*  
*simplicilinea pagenstecheri*

### CONGO REPUBLIC (8)

*Milocera*  
*pelops*  
*Chiasmia*  
*ammodes*  
*conturbata*  
*feraliata*  
*fontainei*  
*nana*  
*ostentosaria*  
*threnopis*

### CYPRUS (1)

*Chiasmia*  
*syriacaria*

### DAHOMEY (2)

*Chiasmia*  
*affinis*  
*ferahata*

### EGYPT (2)

*Isturgia*  
*exastaria*  
*Chiasmia*  
*aestimaria*

### ETHIOPIA (27)

*Acanthovalva*  
*inconspicuaria*

<i>Platypepla</i>	<i>fontainei</i>	<i>Chiasmia</i>
<i>uhlenhuthi</i>	<i>majestica majestica</i>	<i>acutiapex</i>
<i>Isturgia</i>	<i>rectistriaria</i>	<i>affinis</i>
<i>disputaria</i>	<i>streniata streniata</i>	<i>amarata chaica</i>
<i>exospilata</i>		<i>assimilis</i>
<i>netta</i>		<i>ate</i>
<i>presbitaria</i>		<i>brongusaria brangusaria</i>
<i>quadriplaga</i>		<i>butaria</i>
<i>sublimbata</i>		<i>cararia</i>
<i>Chiasmia</i>		<i>confuscata</i>
<i>abyssinica</i>		<i>cantaminata</i>
<i>ate</i>		<i>casticommata</i>
<i>brangusaria brangusaria</i>		<i>castiguttata</i>
<i>buettkeri</i>		<i>curvilineata</i>
<i>butaria</i>		<i>evansi</i>
<i>castiguttata</i>		<i>extrusilinea</i>
<i>dentilineata</i>		<i>featheri</i>
<i>maculasa</i>		<i>feraliata</i>
<i>pracidata pracidata</i>		<i>fulvimarga</i>
<i>puerilis</i>		<i>fulvisparsa</i>
<i>rectistriaria</i>		<i>fuscataria</i>
<i>semialbida</i>		<i>geminilinea</i>
<i>streniata streniata</i>		<i>getula</i>
<i>subcurvaria araps</i>		<i>initatrix</i>
<i>subcurvaria subcurvaria</i>		<i>inconspicua pertaea</i>
<i>trinotata</i>		<i>infabricata</i>
<i>trinotatula</i>		<i>inquinata</i>
<i>umbratilis</i>		<i>johnstoni</i>
<i>unifilata</i>		<i>kenyae</i>
<b>FERNANDO PO (1)</b>		<i>kilifi</i>
<i>Chiasmia</i>		<i>maculasa</i>
<i>separata separata</i>		<i>multistrigata multistrigata</i>
<b>GABON (3)</b>		<i>nana</i>
<i>Chiasmia</i>		<i>natalensis</i>
<i>crumenata</i>		<i>nubilata</i>
<i>fuscataria</i>		<i>obliquilineata</i>
<i>astentasaria</i>		<i>olindaria</i>
<b>GAMBIA (2)</b>		<i>ostentosaria</i>
<i>Isturgia</i>		<i>parastreniata</i>
<i>deerraria</i>		<i>pracidata procidata</i>
<i>Cliasmia</i>		<i>rectistriaria</i>
<i>sudanata</i>		<i>rhabdaphara</i>
<b>GHANA (13)</b>		<i>semialbida</i>
<i>Milocera</i>		<i>semicolor</i>
<i>aureolitaralis</i>		<i>separata separata</i>
<i>Isturgia</i>		<i>simplex</i>
<i>catalaunaria</i>		<i>simplicilinea simplicilinea</i>
<i>deerraria</i>		<i>saror</i>
<i>Chiasmia</i>		<i>streniata streniata</i>
<i>affinis</i>		<i>subcretata</i>
<i>angalae</i>		<i>(subcurvaria araps)</i>
<i>conturbata</i>		<i>subcurvaria subcurvaria</i>
<i>fantainei</i>		<i>subvaria</i>
<i>fulvisparsa</i>		<i>threnapis</i>
<i>fuscataria</i>		<i>triganaleuca</i>
<i>majestica tropica</i>		<i>trigonoleuca</i>
<i>nana</i>		<i>trinatata</i>
<i>ostentasaria</i>		<i>trizanaria</i>
<i>threnapis</i>		<i>unbrata unbrata</i>
<b>GUINEA (6) (incl. French and Lower Guinea)</b>		<i>umbratilis</i>
<i>Milocera</i>		<i>warreni</i>
<i>thyestes</i>		<i>zelata</i>
<i>Chiasmia</i>		
<i>affinis</i>		
<b>GUINEA (form. Span. Guinea) (3)</b>		<b>LEBANON (3)</b>
<i>Chiasmia</i>		<i>Acanthovalva</i>
<i>astentosaria</i>		<i>incanspiciaria</i>
<i>rectistriaria</i>		<i>Isturgia</i>
<i>streniata streniata</i>		<i>berytaria</i>
<b>IVORY COAST (17)</b>		<i>perviaria</i>
<i>Milocera</i>		
<i>diffusata</i>		
<i>Chiasmia</i>		
<i>albivia</i>		
<i>canturbata</i>		
<i>crumenata</i>		
<i>feraliata</i>		
<i>fantainei</i>		
<i>fulvisparsa</i>		
<i>impar</i>		
<i>nana</i>		
<i>ostentosaria</i>		
<i>peremarginata</i>		
<i>plutacrypsis</i>		
<i>separata separata</i>		
<i>simplicilinea simplicilinea</i>		
<i>subvaria</i>		
<i>threnapis</i>		
<i>triganaleuca</i>		
<b>KENYA (79)</b>		
<i>Acanthovalva</i>		
<i>incanspiciaria</i>		
<i>Plateoplia</i>		
<i>acrabelia</i>		
<i>Platypepla</i>		
<i>bullifera</i>		
<i>schistopenis</i>		
<i>Milocera</i>		
<i>aurara</i>		
<i>diffusata</i>		
<i>herbulati</i>		
<i>pelaps</i>		
<i>podacarpi</i>		
<i>Cheloteplirina</i>		
<i>crypsispila</i>		
<i>Isturgia</i>		
<i>albagrisea</i>		
<i>arizela</i>		
<i>catalaunaria</i>		
<i>disputaria</i>		
<i>exaspilata</i>		
<i>megasaccus</i>		
<i>presbitaria</i>		
<i>quadriplaga</i>		
<i>supergressa</i>		
<b>LESOTHO (3)</b>		
<i>Acanthovalva</i>		
<i>incanspiciaria</i>		
<i>Isturgia</i>		
<i>berytaria</i>		
<i>perviaria</i>		
<b>Isturgia</b>		

<i>deerraria</i>	<i>getula</i>	<i>simplicilinea simplicilinea</i>
<i>Chiasmia</i>	<i>furcata</i>	<i>sororcula</i>
<i>semitecta</i>	<i>infabricata</i>	<i>streniata streniata</i>
<i>simplicilinea simplicilinea</i>	<i>inquinata</i>	<i>subcurvaria subcurvaria</i>
<b>LIBERIA (6)</b>	<i>johnstoni</i>	<i>teciuum</i>
<i>Milocera</i>	<i>kilimanjarensis</i>	<i>threnopis</i>
<i>tantalus</i>	<i>majestica majestica</i>	<i>umbrata umbrata</i>
<i>Chiasmia</i>	<i>nataleensis</i>	
<i>feraliata</i>	<i>normata</i>	<b>MOROCCO (14)</b>
<i>fulvisparsa</i>	<i>orientalis</i>	<i>Acanthovalva</i>
<i>nana</i>	<i>parallacta</i>	<i>inconspicuaria</i>
<i>ostentosaria</i>	<i>paucimacula</i>	<i>Narraga</i>
<i>plutocryspsis</i>	<i>procidata semispurcata</i>	<i>nelvae nelvae</i>
<b>MADAGASCAR (31)</b>	<i>rhabdophora</i>	<i>Tephrina</i>
<i>Acanthovalva</i>	<i>semicolor</i>	<i>murinaria cinerascens</i>
<i>itremo</i>	<i>separata separata</i>	<i>Isturgia</i>
<i>Milocera</i>	<i>simplicilinea simplicilinea</i>	<i>deerraria</i>
<i>horaria</i>	<i>streniata streniata</i>	<i>famula brunea</i>
<i>Sphyrocosta</i>	<i>subcurvaria subcurvaria</i>	<i>miniosaria duponcheli</i>
<i>madecassa</i>	<i>teciuum</i>	<i>rubrior</i>
<i>Isturgia</i>	<i>threnopis</i>	<i>spodiaria mizanensis</i>
<i>averyi</i>	<i>trizonaria</i>	<i>Itame</i>
<i>contexta</i>	<i>turbulentata</i>	<i>teknaria</i>
<i>deerraria</i>		<i>vincularia latefasciata</i>
<i>devecta</i>		<i>vincularia mrassiniaria</i>
<i>griveaudi</i>	<b>MAURITANIA (2)</b>	<i>Boarmioides</i>
<i>modestaria</i>	<i>Isturgia</i>	<i>colpias</i>
<i>sakalava</i>	<i>spodiaria mizanensis</i>	<i>Macaria</i>
<i>univirgaria</i>	<i>Chiasmia</i>	<i>wauaria africana</i>
<i>Chiasmia</i>	<i>sudanata</i>	<i>Chiasmia</i>
<i>avitusarioides</i>		<i>clathrata azrouensis</i>
<i>banian</i>	<b>MOÇAMBIQUE (42)</b>	
<i>coronoleucas</i>	<i>Platypepla</i>	
<i>crassilembaria</i>	<i>spurcata</i>	
<i>herbuloti</i>	<i>Acanthovalva</i>	
<i>hypactinia</i>	<i>bilineata</i>	
<i>insulicola</i>	<i>inconspicuaria</i>	
<i>malgassofusca</i>	<i>Plateoplia</i>	
<i>megalesia</i>	<i>acrobelia</i>	
<i>normata</i>	<i>Isturgia</i>	
<i>orthostates</i>	<i>arizeloides</i>	
<i>separata conjugata</i>	<i>catalanaria</i>	
<i>simplicilinea pagenstecheri</i>	<i>deerraria</i>	
<i>streniata arata</i>	<i>exospilata</i>	
<i>tetragraphicata</i>	<i>spissata</i>	
<i>trirecura</i>	<i>supergressa</i>	
<i>tsaratanaana</i>	<i>Chiasmia</i>	
<i>umbrata juvenilis</i>	<i>alternata</i>	
<i>Malgassothisa</i>	<i>amarata amarata</i>	
<i>trifida</i>	<i>ammodes</i>	
<i>'Semiiothisa'</i>	<i>assimilis</i>	
<i>peyrierasi</i>	<i>boarmioides</i>	
<b>MALAWI (34)</b>	<i>brongusaria brongusaria</i>	
<i>Acanthovalva</i>	<i>confuscata</i>	
<i>inconspicuaria</i>	<i>curvifascia</i>	
<i>Milocera</i>	<i>deceptrix</i>	
<i>arcifera</i>	<i>extrusilinea</i>	
<i>aurora</i>	<i>feraliata</i>	
<i>Isturgia</i>	<i>fuscataria</i>	
<i>deerraria</i>	<i>grisescens</i>	
<i>exospilata</i>	<i>inconspicua inconspicua</i>	
<i>Chiasmia</i>	<i>inquinata</i>	
<i>ammodes</i>	<i>kilimanjarensis</i>	
<i>confuscata</i>	<i>majestica majestica</i>	
<i>contaminata</i>	<i>marmorata</i>	
<i>crassata</i>	<i>maronga</i>	
<i>curvifascia</i>	<i>nana</i>	
<i>extrusilinea</i>	<i>orientalis</i>	

**NIGER (2)**

*Chiasmia*  
*laimarginaria*  
*sudanata*

**NIGERIA (27)**

*Milocera*  
*divorsa*  
*Platypepla*  
*curvigliadiata*  
*Isturgia*  
*catalaunaria*  
*deerraria*  
*disputaria*  
*quadriplaga*  
*Chiasmia*  
*albivia*  
*conturbata*  
*dannariae*  
*feraliata*  
*fontainei*  
*fulvisparsa*  
*fuscataria*  
*impar*  
*maculosa*  
*majestica tropica*  
*nana*  
*normata*  
*ostentosaria*  
*parallacta*  
*paucimacula*  
*rectistriaria*  
*separata separata*  
*streniata streniata*  
*sudanata*  
*umbrata umbrata*  
*unifilata*

**RWANDA (26)**

*Milocera*  
*eugompha*  
*hypantycha*  
*sexcornuta*  
*umbrosa*

*Isturgia*  
*virescens*

*Chiasmia*  
*anguifera*

*butaria*  
*costiguttata*

*crassata*  
*curvilineata*

*flavicuneata*  
*fulvimarga*

*fuscataria*  
*geminilinea*

*glyliura*  
*infabricata*

*inouei inouei*  
*jalustani*

*obliquilineata*  
*percnoptera*

*pervittata*  
*phaeostigma*

*procidata procidata*  
*rectistriaria*

*separata separata*  
*streniata streniata*

**SAO TOME E PRINCIPE (1)**

*Chiasmia*

*fuscataria*

**[SAUDI] ARABIA (12)**

*Isturgia*  
*deerraria*  
*disputaria*  
*pervaria*  
*plilbyi*  
*quadriplaga*  
*sublimbata*  
*Chiasmia*  
*buettkeri*  
*frontosa*  
*latimarginaria*  
*procidata fumida*  
*sareptanaria*  
*subcurvaria araps*

**SENEGAL (7)**

*Isturgia*  
*deerraria*  
*inaequivirgaria*  
*Chiasmia*  
*majestica majestica*  
*sareptanaria*  
*senegambiensis*  
*streniata streniata*  
*sudanata*

**SIERRA LEONE (6)**

*Chiasmia*  
*canturbata*  
*fontainei*  
*ostentosaria*  
*rectistriaria*  
*streniata streniata*  
*tlrenopis*

**SOMALIA (13)**

*Isturgia*  
*deerraria*  
*netta*  
*prionogyna*  
*quadriplaga*  
*Chiasmia*  
*assimilis*  
*butaria*  
*calvifrons*  
*latimarginaria*  
*obliquilineata*  
*puerilis*  
*semialbida*  
*somalica*  
*subcurvaria araps*

**SPAIN (4)**

*Acanthavalva*  
*inconspicuaria*  
*Isturgia*  
*catalaunaria*  
*deerraria*  
*Chiasmia*  
*aestimaria*

**SOUTH AFRICA (76)**

*Acanthavalva*  
*bilineata*  
*capensis*  
*focularia*  
*inconspicuaria*  
*Platypepla*  
*flava*  
*griseobrunnea*  
*macilenta*  
*mackayi*  
*persubtilis*  
*pseudospurcata*  
*spurcata*  
*Plateoplia*  
*acrobelia*  
*Chelotephrina*  
*acorema*  
*Isturgia*  
*arizeloides*  
*catalaunaria*  
*deerraria*  
*dukudu*  
*exerraria*  
*exospilata*  
*geminata*  
*spissata*  
*supergressa*  
*Chiasmia*  
*abnormata*  
*alternata*  
*amarata amarata*  
*arenosa*  
*assimilis*  
*boarmioides*  
*brongusaria brongusaria*  
*brongusaria exasciodes*  
*brunnescens*  
*castanea*  
*confuscata*  
*crassata*  
*curvifascia*  
*deceptrix*  
*diarmodia*  
*duplicilinea*  
*extrasilinea*  
*feraliata*  
*furcata*  
*grimmia*  
*grisescens*  
*inaequilinea inaequilinea*  
*inconspicua inconspicua*  
*inquinata*  
*interrupta*  
*jolinstoni*  
*kilimanjarensis*  
*kirbyi*  
*marmorata*  
*multistrigata liliput*  
*multistrigata multistrigata*  
*natalensis*  
*nobilitata*  
*normata*  
*nubilata*  
*observata*  
*paucimacula*  
*procidata semispurcata*  
*punctilinea*  
*rectistriaria*  
*semitecta*  
*separata separata*  
*simplicilinea simplicilinea*  
*sororecula*  
*streniata streniata*  
*subcurvaria subcurvaria*  
*suriens*  
*technium*

<i>tristis</i>	<i>deerraria</i>	<i>warreni</i>
<i>trizonaria</i>	<i>exopsilata</i>	<i>zelota</i>
<i>turbulentata</i>	<i>kiellandi</i>	<b>TOGO (4)</b>
<i>umbrata umbrata</i>	<i>presbitaria</i>	<i>Isturgia</i>
<i>umbratilis</i>	<i>pygmaeata</i>	<i>deerraria</i>
<i>vau</i>	<i>quadriplaga</i>	<i>Chiasmia</i>
<b>SUDAN (7)</b>	<i>spissata</i>	<i>fontainei</i>
<i>Isturgia</i>	<i>sublimbata</i>	<i>nana</i>
<i>catalaunaria</i>	<i>supergressa</i>	<i>ostentosaria</i>
<i>Chiasmia</i>	<i>triseriata</i>	<b>TRANSKEI (31)</b>
<i>affinis</i>	<i>Chiasmia</i>	<i>Acanthovalva</i>
<i>ate</i>	<i>acutiapex</i>	<i>inconspicuaria</i>
<i>maculosa</i>	<i>amarata choica</i>	<i>Platypela</i>
<i>sudanata</i>	<i>androphoba</i>	<i>macilenta</i>
<i>unifilata</i>	<i>assimilis</i>	<i>spurcata</i>
<i>zelota</i>	<i>ate</i>	<i>Cheloteplrina</i>
<b>SWAZILAND (22)</b>	<i>brongusaria brongusaria</i>	<i>acorema</i>
<i>Acanthovalva</i>	<i>butaria</i>	<i>Isturgia</i>
<i>inconspicuaria</i>	<i>confuscata</i>	<i>catalaunaria</i>
<i>Platypela</i>	<i>contaminata</i>	<i>deerraria</i>
<i>persubtilis</i>	<i>costiguttata</i>	<i>exospilata</i>
<i>Plateoplia</i>	<i>crassata</i>	<i>geminata</i>
<i>acrobelia</i>	<i>curvilineata</i>	<i>spissata</i>
<i>Isturgia</i>	<i>deceptrix</i>	<i>Chiasmia</i>
<i>deerraria</i>	<i>dentilineata</i>	<i>abnormata</i>
<i>supergressa</i>	<i>dodoma</i>	<i>arenosa</i>
<i>Chiasmia</i>	<i>extrusilinea</i>	<i>assimilis</i>
<i>abnormata</i>	<i>feraliata</i>	<i>brongusaria brongusaria</i>
<i>assimilis</i>	<i>fitzgeraldi</i>	<i>confuscata</i>
<i>brongusaria brongusaria</i>	<i>fulvisparsa</i>	<i>duplicilineata</i>
<i>confuscata</i>	<i>geminilinea</i>	<i>inquinata</i>
<i>interrupta</i>	<i>getula</i>	<i>interrupta</i>
<i>jolustoni</i>	<i>gyliura</i>	<i>johustoni</i>
<i>kilimanjarensis</i>	<i>impar</i>	<i>kirbyi</i>
<i>kirbyi</i>	<i>inconspicua pertaesia</i>	<i>multistrigata multistrigata</i>
<i>nobilisata</i>	<i>infabricata</i>	<i>normata</i>
<i>normata</i>	<i>inquinata</i>	<i>observata</i>
<i>rectistriaria</i>	<i>iringa</i>	<i>procidata semispurcata</i>
<i>simplicilinea simplicilinea</i>	<i>jolmstoni</i>	<i>rectistriaria</i>
<i>subcurvaria subcurvaria</i>	<i>[kenyae] ♀</i>	<i>semitecta</i>
<i>suriens</i>	<i>kilimanjarensis</i>	<i>separata separata</i>
<i>trizonaria</i>	<i>lindemannae</i>	<i>simplicilinea simplicilinea</i>
<i>umbrata umbrata</i>	<i>maculosa</i>	<i>strenuata strenuata</i>
<i>umbratilis</i>	<i>morogoro</i>	<i>subcurvaria subcurvaria</i>
<b>SYRIA (3)</b>	<i>multistrigata multistrigata</i>	<i>umbrata umbrata</i>
<i>Acanthovalva</i>	<i>natalensis</i>	<i>umbratilis</i>
<i>inconspicuaria</i>	<i>normata</i>	<b>TUNISIA (6)</b>
<i>Isturgia</i>	<i>nubilata</i>	<i>Isturgia</i>
<i>berytaria</i>	<i>obliquilineata</i>	<i>disputaria</i>
<i>Chiasmia</i>	<i>orientalis</i>	<i>hausmanni</i>
<i>syriacaria</i>	<i>parastreniata</i>	<i>spodiaria mizanensis</i>
<b>TANZANIA (82)</b>	<i>paucimacula</i>	<i>terminipuncta</i>
<i>Acanthovalva</i>	<i>perchnoptera</i>	<i>Itame</i>
<i>bilineata</i>	<i>procidata procidata</i>	<i>vincularia lycoidaria</i>
<i>magna</i>	<i>punctilinea</i>	<i>Chiasmia</i>
<i>Plateoplia</i>	<i>rectistriaria</i>	<i>aestimaria</i>
<i>acrobelia</i>	<i>rhabdophora</i>	<b>UGANDA (65)</b>
<i>Milocera</i>	<i>separata separata</i>	<i>Plateoplia</i>
<i>arcifera</i>	<i>simplex</i>	<i>acrobelia</i>
<i>aurora</i>	<i>simplicilinea simplicilinea</i>	<i>Milocera</i>
<i>eugompha</i>	<i>strenuata strenuata</i>	<i>diffusata</i>
<i>herbuloti</i>	<i>subcretata</i>	<i>dubia</i>
<i>ustatoides</i>	<i>subcurvaria subcurvaria</i>	<i>hypamycha</i>
<i>Isturgia</i>	<i>subvaria</i>	<i>pelops</i>
<i>albogrisea</i>	<i>suriens</i>	<i>sexcornuta</i>
<i>arizela</i>	<i>tecum</i>	<i>tautalus</i>
<i>catalaunaria</i>	<i>trinotata</i>	<i>umbrosa</i>
	<i>umbrata umbrata</i>	
	<i>umbratilis</i>	
	<i>unifilata</i>	

<i>ustataides</i>	<i>deerraria</i>	<i>triseriata</i>
<i>Chelatephrina</i>	<i>disputaria</i>	<i>Chiasmia</i>
<i>crypsispila</i>	<i>quadriplaga</i>	<i>ammades</i>
<i>Isturgia</i>	<i>sublimbata</i>	<i>baarmiades</i>
<i>catalaunaria</i>	<i>Chiasmia</i>	<i>confuscata</i>
<i>deerraria</i>	<i>latimarginaria</i>	<i>crassata</i>
<i>exaspilata</i>	<i>streniata streniata</i>	<i>curvifascia</i>
<i>presbitaria</i>		<i>deceptrix</i>
<i>Chiasmia</i>		<i>extrusilinea</i>
<i>affinis</i>		<i>fitzgeraldi</i>
<i>albivia</i>	<i>Milacera</i>	<i>furcata</i>
<i>anguifera</i>	<i>aurora</i>	<i>jalunstani</i>
<i>assimilis</i>	<i>diffusata</i>	<i>kilimanjarensis</i>
<i>aureabrunnea</i>	<i>dubia</i>	<i>majestica majestica</i>
<i>brongusaria brangusaria</i>	<i>falcula</i>	<i>nana</i>
<i>callaxata</i>	<i>pelops</i>	<i>narmata</i>
<i>confuscata</i>	<i>pyrinia</i>	<i>orientalis</i>
<i>canturbata</i>	<i>tantalus</i>	<i>parallacta</i>
<i>curvilineata</i>	<i>Isturgia</i>	<i>paucimacula</i>
<i>dentilineata</i>	<i>deerraria</i>	<i>rectistriaria</i>
<i>extrusilinea</i>	<i>exaspilata</i>	<i>rhabdophora</i>
<i>feraliata</i>	<i>Chiasmia</i>	<i>simplicilinea simplicilinea</i>
<i>flavicuneata</i>	<i>affinis</i>	<i>saracula</i>
<i>fontainei</i>	<i>annodes</i>	<i>streniata streniata</i>
<i>fulvimarga</i>	<i>angolaria</i>	<i>subcurvaria subcurvaria</i>
<i>fulvisparsa</i>	<i>anguifera</i>	<i>umbrata umbrata</i>
<i>fuscataria</i>	<i>assimilis</i>	
<i>getula</i>	<i>austera</i>	<i>unifilata</i>
<i>grandis</i>	<i>collaxata</i>	
<i>gyliura</i>	<i>crassata</i>	
<i>impar</i>	<i>crumenata</i>	
<i>infabricata</i>	<i>curvilineata</i>	
<i>inanei inaeui</i>	<i>fitzgeraldi</i>	
<i>inquinata</i>	<i>fulvimarga</i>	
<i>maculosa</i>	<i>fulvisparsa</i>	
<i>nana</i>	<i>fuscataria</i>	
<i>obliquilineata</i>	<i>grandis</i>	
<i>orientalis</i>	<i>inouei inouei</i>	
<i>astentasaria</i>	<i>kilimanjarensis</i>	
<i>paucimacula</i>	<i>majestica majestica</i>	
<i>percnoptera</i>	<i>manapepla</i>	
<i>pervittata</i>	<i>nana</i>	
<i>phaeastigma</i>	<i>astentasaria</i>	
<i>plutacypris</i>	<i>parallacta</i>	
<i>pracidata procidata</i>	<i>paucimacula</i>	
<i>rectistriaria</i>	<i>percnaptera</i>	
<i>semicalcar</i>	<i>pervittata</i>	
<i>separata separata</i>	<i>pracidata pracidata</i>	
<i>simplicilinea simplicilinea</i>	<i>rectistriaria</i>	
<i>streniata streniata</i>	<i>rhabdaphara</i>	
<i>subcretata</i>	<i>streniata streniata</i>	
<i>subcurvaria subcurvaria</i>	<i>subcretata</i>	
<i>subvaria</i>	<i>threnopis</i>	
<i>threnopis</i>	<i>umbrata umbrata</i>	
<i>trigonoleuca</i>	<i>unifilata</i>	
<i>trinatata</i>	<i>unigeminata</i>	
<i>trizanaria</i>		
<i>umbrata umbrata</i>		
<i>unifilata</i>		
<i>unigeminata</i>		
<b>UPPER VOLTA (now Burkina Faso) (4)</b>		
<i>Isturgia</i>		
<i>catalaunaria</i>		
<i>Chiasmia</i>		
<i>impracera</i>		
<i>majestica trapica</i>		
<i>streniata streniata</i>		
<b>YEMEN (6)</b>		
<i>Isturgia</i>		

<i>fuscatoria</i>	<i>melsetter</i>	<i>rhabdophora</i>
<i>geminilinea</i>	<i>multistrigata liliput</i>	<i>semicolor</i>
<i>getula</i>	<i>multistrigata multistrigata</i>	<i>semitolvacea</i>
<i>grimmia</i>	<i>mrrina</i>	<i>separata separata</i>
<i>grisescens</i>	<i>nana</i>	<i>simplicilinea simplicilinea</i>
<i>hunyam</i>	<i>natalensis</i>	<i>sororcula</i>
<i>inconspicua inconspicua</i>	<i>nevilledukei</i>	<i>streniata streniata</i>
<i>infabricata</i>	<i>normata</i>	<i>subcurvaria subcurvaria</i>
<i>inquinata</i>	<i>mbilata</i>	<i>subvaria</i>
<i>interrupta</i>	<i>parallacta</i>	<i>suriens</i>
<i>johnstoni</i>	<i>pancimacula</i>	<i>tecum</i>
<i>kilimanjarensis</i>	<i>pinheyi</i>	<i>trizonaria</i>
<i>majestica majestica</i>	<i>procidata semispircata</i>	<i>turbulentata</i>
<i>marmorata</i>	<i>punctilinea</i>	<i>umbrata umbrata</i>
<i>maronga</i>	<i>rectistriaria</i>	<i>unifilata</i>

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